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THE AUTOMOBILE

Inconsistencies in Auto Laws

EXISTING laws covering the operation of automobiles in the various states of the country have, by reason of numerous inconsistencies, proved trying to motorists in numberless instances. Not only is there a lack of uniformity in the laws of widely separated states, but even where they are contiguous there is often the widest divergence in the text and construction of the laws.

Nobody has questioned the police power of any of the states to regulate the speed and to lay down rules for automobiles and all other kinds of traffic. Neither has a voice been raised against the taxation of automobiles as personal property, precisely the same as horse-drawn vehicles or pipe organs or mining stock. No one has heard any protest against any law that has for its object the protection of the public from reckless driving or that tends to insure competence in paid drivers. But when it comes to subjecting interstate traffic of automobiles to the action of thirty-nine different sets of automobile traffic laws, patience ceases to be a virtue. Almost all these laws differ radically one from the other, and it would take something more than a Philadelphia lawyer to understand them all. Even then his understanding might differ from that of Si Perkins, constable of Prunty's Corners, or that of Squire Squidgins, J. P., who might be called upon to sit on his case.

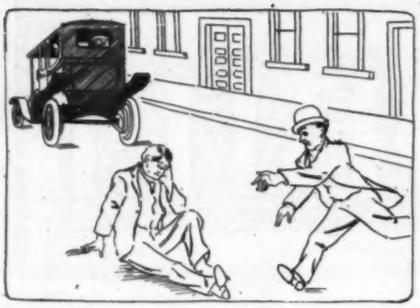
In fact the automobile laws of almost every state in the Union have been construed and declared by the courts of the various states diametrically opposite at the same time.

Thus the legal situation is highly mixed and there is no possible way for a man to make absolutely sure of no interference by the authorities. For instance, in New York State the statute says that 30 miles an hour continued for one-quarter mile is presumptive evidence of reckless driving. And yet nobody in New York City is sure that he can drive his car at all without coming in contact with the law.

Another instance recently noted in Virginia was the case of the Glidden tourists who were arrested at Harrisonburg for driving at 10 miles an hour when the State law says that 20 miles an hour is not illegal.

There are thirty-eight states that have special automobile laws, and the District of Columbia also rejoices in a set. There is no national law on the subject, and the preponderance of legal opinion seems to be that there can be no such unless Congress wishes to consider the taxing and regulating of one variety of interstate traffic without touching any of the rest. As this is prohibited by the constitution, the chances for a national law seem unflattering.

As an instance: If a horse-drawn truck, loaded with merchandise, traveled from New York to Washington, no question



Felony in New York to escape after accident

would be raised as to its rights to use the roads without paying any national or State license. If a gasoline motor were substituted for the horses there would be no more reason for taxing it than the horse-drawn wagon. The states might assume the right to regulate the automobile coming from another state, but the national government could not do so, according to the opinion of well-versed legal lights.

Therefore, the remedy for the jumble into which the legal aspect has been mixed seems to lie in a common understanding among the states. Already steps have been taken that look to such an ultimate result.

The present status of the law in the thirty-eight states and District of Columbia as it applies to automobile operation is treated. Dividing the general aspect into eight phases or heads, a careful digest of the laws shows the situation to be unsatisfactory. The heads considered are these: Registration and fees; license to operate and fees; the law as to non-residents; equipment required; regulation of chauffeurs; speed provisions; penalties and the legal status of local ordinances.

Regarding Registration and Fees Therefor

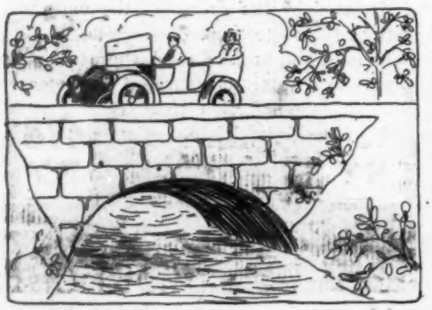
With reference to registration and fees connected with that section of the laws there is a wide divergence of text and construction. In Alabama registration is required on October 1, when numbers are assigned and certificates issued. The fee is from $7.50 to $20, depending on horsepower. Manufacturers and dealers are required to register, the fee being $100 in their cases, with an additional tax on the horsepower of all cars belonging to them. This is $1 per horsepower under 20 horsepower and 50 cents per horsepower over that number. Registration number must be carried at the rear and only one set may be displayed.

In Arkansas yearly registration is required December 31; two sets of number plates must be shown, front and rear, and a metal seal issued by the Secretary of State must be carried. General registration is commanded upon the parts of manufacturers and dealers. The fee charged is $5 per car.

In California the license plate must be shown in the rear, while on the front lamps the numbers must be displayed. Fee, $2 a car.

Connecticut also requires annual registration; one set of numbers and fees based upon 50 cents a horsepower. Commercials must pay $5 for cars of 1000 pounds' capacity or less, and $2 for each additional 1000 pounds. The law also makes a charge of $1 for each motor tested by manufacturers on the public highways.

Delaware makes it obligatory to show number plates in front and behind. Registration fee, $5 a car.



North Carolina—5 miles an hour over bridges

In the District of Columbia the number must be shown behind and $2 is charged for each identification tag.

Florida's law is similar.

In Illinois number plates must be shown front and rear, and the fees range from $4 a car of less than 25 horsepower to $10 for one of more than 50 horsepower. General registration is required for manufacturers and dealers, fee $15.

Indiana only charges $1 for registration.

In Iowa the fees range from $8 for a car less than 20 horsepower to any additional amount reckoned at 40 cents a horsepower. After four years' payment on a car the fees are cut in half.

Kansas, Montana and South Carolina have made no legislative provision for registration, and consequently charge no fees for that particular thing.

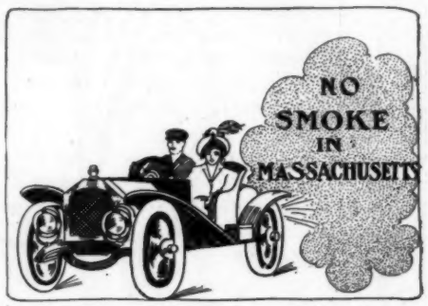
Kentucky charges fees from $10 to $20, depending on horsepower, and requires numbers to be shown front and rear. Maine's law makes the fees from $5 to $15 for passenger automobiles and $10 for trucks.

In Maryland the fees are from $12 to $24; in Massachusetts, $5 to $25; Michigan, $3, and if the license is taken out after August 1 it is $1.50.

In Minnesota registration is commanded every three years; fees, $1.50.

Missouri law says that number plates may only be shown in the rear. Fees range from $2 to $12. The Nebraska motorist must pay $2 a year. In Nebraska the fees run from $10 to $40; dealers are taxed $40.

In New York annual registration February 1. Fees range from $5 to $25, and after four years' payment they are cut in half. Trucks and deliveries cost $5 a year to register. From August 1 to February 1 the fee is half the statutory amount for one year.



The old Bay State laws punish smoking

New Jersey fees for registration are from $3 to $10, and in North Carolina $5, with renewal privilege at $1. North Dakota, $3; Ohio, $5; Oregon, from $3 to $10; Pennsylvania, $5 to $15. The Pennsylvania law provides that manufacturers and dealers' cars shall only be operated by duly qualified and licensed drivers.

In Rhode Island the fee is from $5 to $25, with $2 each for commercial cars and $50 for manufacturers and dealers.

South Dakota charges $1 for registration; Tennessee, $2; Texas, 50 cents; Utah, $2.

Vermont charges $1 a horsepower and reduces the rate 25 per cent. a year for the second and third registrations. Virginia fees range from $5 to $20, with a dealers' fee of $50.

Washington exacts $2 for registration; West Virginia and Wisconsin the same amount.

It will be found that in a general way the regulations as far as registration are concerned are pretty much alike except as to the amount of the fees charged. Annual registration is definitely commanded in twenty-five of the states and is understood in six others. Three states do not require it, in addition, of course, to the other eight, which have no automobile laws at all.

Fees range from 50 cents in Texas to $40 in several of the states where a maximum charge is imposed for registration.

The main idea involved in this section of the law is to get a complete record of ownership so as to insure identification. Several states reduce the fee after the original entry.

As to Licensing Automobile Drivers

The second phase of the automobile laws is that which provides licensing to operate. In Alabama only chauffeurs come under the rule, save that no person under 16 years of age may run a car unless accompanied by an adult.

In Arkansas, California, Florida, Illinois, Michigan, Missouri,

Ohio, Pennsylvania, Utah and West Virginia there are no licenses required to operate cars except in the case of paid chauffeurs.

Indiana, Iowa, Kansas, Kentucky, Montana, North Carolina, North Dakota, South Carolina, South Dakota, Tennessee, Texas, Washington and Wisconsin exempt even the chauffeur from registration or the necessity for taking out a license.

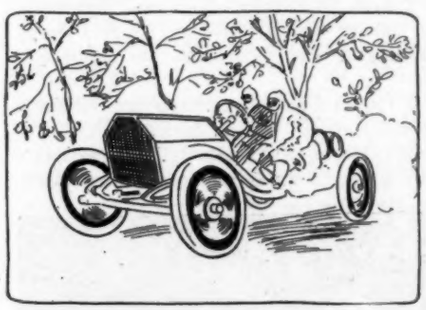
In Connecticut all operators are licensed annually, fee $2. In Delaware the fee is $5. District of Columbia, $2; Maine, $2; Maryland, $2; Massachusetts, $2, with renewal 50 cents; New Hampshire, $3, with renewal $1; New Jersey, from $2 to $4, depending on horsepower; Oregon requires all operators to register as chauffeurs; Rhode Island, $1; Vermont, $2. In Virginia the annual license for the car's owner is included in the registration fee and is construed to cover members of the owner's family. Chauffeurs and others are taxed $2.50.

In the other states which have laws children are prohibited from driving.

Of the thirty-eight states considered thirteen make no restrictions whatever as to the driver, while ten tax the chauffeur only. In eleven states all operators must register, the fee ranging from nothing in Oregon to $5 in Delaware.

Rights and Duties of the Non-Resident

This section of the laws is one of the most important of all, as it touches upon the safety of the public as well as motordom. It is conceivable that a man of notorious reputation for carelessness, drunkenness or some other vital fault in New York, might go to Indiana, for example, and drive the private car of some wealthy man, when he could not do so on account of his record in his home state.



In Texas road racing is prohibited by law

The section of the laws that deals with the status of non-resident motorists shows some signs of uniformity.

In Alabama non-residents, upon compliance with the law of the state of their residence and displaying registration number, are granted the same exemptions that are accorded residents of Alabama in the state in which the non-resident lives.

In Arkansas compliance with the law of one's own home state, displaying numbers and carrying lights is enough to gain exemption for the visitor. California does not mention the lights in granting exemption. Connecticut laws are similar, but provide for revocation of the exemption upon conviction for violation of any clause of the Motor Vehicle Act.

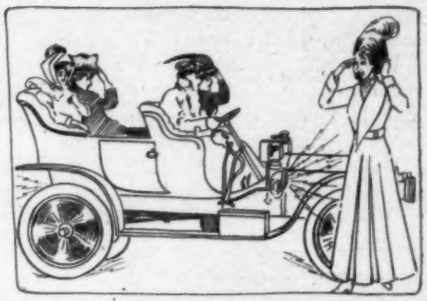
Reciprocity is the keynote of the Delaware provision as it is in the District of Columbia. Florida exempts registered automobiles for 30 days. Illinois does the same for 60 days in any one year, except in the case of foreign corporations.

The exemption in Indiana is wider and is granted to all cars that have complied with the law at home. Iowa has adopted a similar policy, save that it requires a reciprocal treatment. Kansas makes no provision in its law. Kentucky only asks that the car be legally clean at home.

In Maine an exemption of 30 days is granted to cars that have complied with home laws and driven by a person duly licensed to operate the automobile. Maryland partially exempts cars for two periods of 7 days each in one year providing non-resident's tags are secured from the commissioner of motor vehicles.

Massachusetts exempts visiting cars from registration for 10 days a year on a reciprocal basis. Half rates are charged visitors in summer who overstay that period.

Michigan requires that home law be satisfied and reciprocity extended to her own citizens.



New Jersey prohibits noise on its highways

Minnesota places a 30-day limit on visitors without registration.

Missouri's limit is 20 days; Montana makes no provision; Nebraska, 30 days; New Hampshire, 10 days, but car must be driven by duly licensed driver. Half rates are charged visitors for the three summer months. New York is on a reciprocal basis except as concerns foreign corporations.

New Jersey: Non-residents are not exempt except under special driver's license, which remains in force for eight consecutive days or four periods of two days each; license issued by Commissioner of Motor Vehicles, or appointed deputy; fee, $1. Non-resident corporations specially licensed to penetrate 15 miles into the state when registered at home and upon payment of $100.

North Carolina allows outside automobiles to pass through without penalty. Others are not exempt.

North Dakota exempts registered cars and Ohio demands reciprocity as well as home registration. Oregon has a limit of 30 days; Pennsylvania, 10 days and reciprocity; Rhode Island, 10 days and provides that the exemption shall be revoked in case of violation of speed regulations.

South Carolina does not cover this point.

South Dakota and Utah require that visiting cars shall be registered at home in order to claim exemption.

Tennessee and Texas make no exemptions.

Vermont, Washington, West Virginia and Wisconsin grant reciprocal exemption and require home registration.

Virginia exempts visitors for two periods of 7 days each in any year.

New Jersey, Tennessee and Texas are the striking examples of the non-reciprocal idea in State laws.

New Jersey is particularly noted for its stringent law, the effect of which has been to lose all exemptions for touring Jerseyites in a score of important and agreeable states unless the Jerseyite pays for registration when he goes touring.

The ideal law on this subject would undoubtedly be a section that provided for the exemption of all outside cars that had complied with the law at home. In that case there would be no necessity for any definite clause providing for reciprocity.

Equipment Commanded by Statute

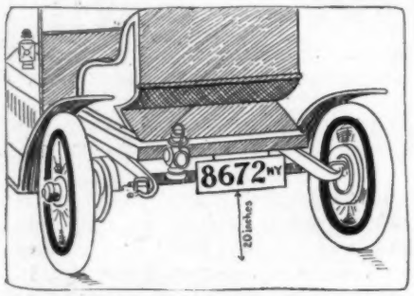
Under the head of equipment there is also a wide divergence. The Alabama law may be taken as a model in this classification. In fact, the Alabama law is quite clear and reasonable in all respects. It covers the following points with regard to equipment: Adequate brakes, suitable signal, two white lights in front and one behind, showing red to the rear and white on the number plate. Lamps must be lighted one-half hour after sunset until one-half hour before sunrise. The Arkansas statute differs from that of Alabama in that it provides that the front lamps must be visible 200 feet away and that the number must be

Arkansas requires numbers on front lamps

displayed on the glass front of the lamps. The motor must be shut down when the car is left standing.

California provides for showing the registration number on the lamps. In Connecticut there must be two sets of brakes and the muffler is required to be used after 9 o'clock at night within the limits of cities or boroughs.

Delaware requires two white front lights and a red tail lamp. In the District of Columbia a lock is commanded in addition to the usual provisions and a muffler is required. Whistle or signal and two lamps are all that are required in Florida.



Some States insist on rear tags being at least 20 inches above the ground

In Illinois there must be brakes, signal, two white lamps in front and one in the rear showing red behind and illuminating the number plate so as to make it visible 150 feet. As a detail, it is ordered that this plate shall clear the ground by at least 20 inches.

Brakes, lamps and signal are required in Indiana, Iowa, Kansas, but in the latter there need be only one front lamp. Kentucky demands brakes, signal and lamps, the front pair of which must carry the registration number. This is the law that caused such a rumpus among the Colonels recently, and which is still in the courts for construction.

Two brakes and a muffler are the features of the Maine law, while the Maryland statute provides that the front lamps be visible 200 feet. Unreasonable noise and smoke are prohibited in Massachusetts, while Michigan lays the ban upon anti-skid devices of all sorts except in wet, slippery weather. The muffler must be used in Minnesota within village or town limits.

Missouri only demands the three usual lamps with brakes and signal. Montana makes no special provision for equipment. Nebraska requires brakes, signal and one or more lamps in front and a red light behind. The muffler must be used in New Hampshire cities and villages.

New York makes the statutory requirement for brakes, signal and three lamps, the rear light illuminating the number plate so that it shall be visible 50 feet away.

Smoke is banned in New Jersey and lights only are required in North Carolina. North Dakota provides for signal and two lamps, one on either side. Ohio's law is similar to that of Alabama. In Oregon the registration number must be shown on the face of the front lamps. The Pennsylvania provision is like Alabama's. Rhode Island's is also, except that the use of the muffler is provided. South Carolina requires at least one white light in front, otherwise the law is the same as Alabama. South Dakota follows the lines of Alabama. In Tennessee only a signal is required. In Texas one lamp and a signal fills the legal requirements. Utah is like Alabama. In Vermont a muffler is required, lamps must bear registration number and a lock is ordered so that the car cannot be set in motion when left alone.

One lamp in front, at least, and a lock, as above, is necessary in Virginia. Washington commands that at least one white lamp carrying the number of the car shall be used. A muffler is also required in cities or villages.

West Virginia's law provides for a speedometer and for front lamps bearing the registration number. In Wisconsin at least one white lamp in front is required.

In all the states except Tennessee that are provided with automobile laws the statute commands the use of a lamp or lamps at night. In all but three states brakes and signals are required. Throughout the foregoing text, unless it is specifically excepted, the law requires lights, brakes and signals.

The Alabama law is excellently framed and covers the main points distinctly. This form of the law has been followed by eighteen states and probably represents the best general line to be followed. In the details of equipment practically all the states differ from one another. There are no two exactly alike, although, as has been said, eighteen are substantially so.

Two front lamps, distinctly visible for a reasonable distance, with one in the rear, showing red behind and shining sidewise upon the number plate, adequate brakes, suitable signal and a due regard for the use of the muffler would seem to embody the essentials of a model law.

Chauffeurs in the Legal Contemplation

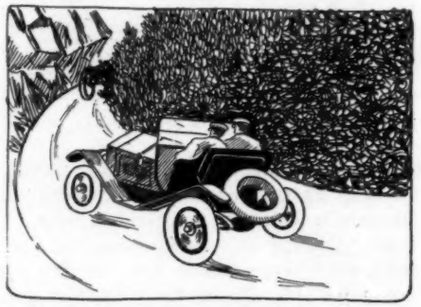
The phase of the law that deals with chauffeurs is badly scattered. The Alabama law on this subject is moderate and effective. It provides for annual registration and requires that applications must be endorsed by three reputable automobile owners. A badge is issued to successful applicants, which must be worn while operating the car. The fee is $5, with a charge of $2.50 for renewals. Non-resident chauffeurs are exempt if they have complied with the law of their home states.

In Arkansas the fee is $1, and grafting is prohibited specifically. California charges $2 for registration and non-residents are not exempt. No special provision is made for chauffeurs' registration in Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey and Rhode Island, in each of which the law requires all operators to register and take out licenses before operating automobiles.

In Indiana, Iowa, Kansas, Kentucky, Montana, Nebraska, North Carolina, North Dakota, South Carolina, South Dakota, Tennessee, Texas, Washington and Wisconsin, the subject is not covered in any way.

Florida charges $2 for registration and exempts non-residents engaged in driving non-resident cars for 30 days.

Illinois examines chauffeurs and the fee is $5, with renewals at $3. In Massachusetts a fee of $2 is required for examination. Michigan, $2, non-residents exempt if home law has been complied with.


Only 10 miles an hour in New Hampshire when approaching a curve

In Minnesota the fee is $3, with renewals at $2. Non-residents are exempt for 60 days. Licenses may be revoked upon third conviction. Missouri, fee, $1.50. The fee in New Hampshire is $5, with renewals at $1. In New York the chauffeurs are required to take an examination and the fee is $5 with renewals at $2. The certificate bears upon its face the photograph of the chauffeur. After February 12, 1912, non-residents will be exempt upon complying with home laws.

Ohio charges $2 for registration. Non-residents are exempt. Oregon requires all operators to undergo registration and charges a fee of $2. Pennsylvania also charges $2. So do Utah, Vermont and West Virginia. Virginia charges $2.50.

Speed Limits of the Various States

It is a patent fact that no person should operate an automobile unless thoroughly competent to do so. Therefore, the trend of opinion is setting toward the registration, examination and licensing of everybody who drives a car. On this basis the law of Connecticut is clear and definite and probably expresses the idea of a fair, safe law as well as any other statute.

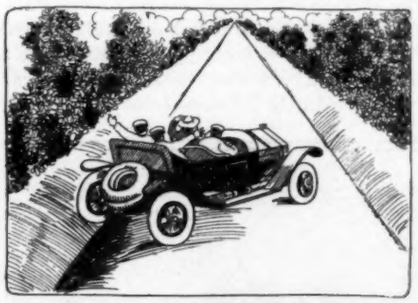
Speed provisions vary as widely as do those covering any other phase of automobiling. A rate of 30 miles an hour for one-quarter mile is deemed presumptive evidence of recklessness

in Alabama. Arkansas places the speed limit at 20 miles an hour for 1-4 mile, with 6 miles an hour as the maximum speed in rounding a corner. California says 20 miles an hour, with 4 miles an hour as the limit on dams, sharp curves or grades. Connecticut marks the limit at 25 miles an hour, with 10 miles an hour on curves and crossings. Delaware 20 miles an hour; District of Columbia the same. Florida only requires a reasonable and proper rate without mentioning maximum figures, and insists on 4 miles an hour on bridges, curves and crossings. In Illinois 25 miles an hour is the limit, with the usual restrictions of speed in built-up sections. Racing is prohibited.

Indiana limits speed to 20 miles an hour, and provides for 6 miles an hour in passing a horse or other draft animal. Iowa says 25 miles an hour and Kansas cuts it down to 20 miles an hour. Kentucky sets the limit at 20 miles an hour; Maine, 25 miles; Maryland, 25 miles; Massachusetts, 20 miles, and provides for the sounding of horns at intersections of the road and at curves where the road is hidden from view. Michigan, 25 miles, with a limit of 10 miles an hour in passing pedestrian or horse. Minnesota, 25 miles an hour. Same for Missouri, Nebraska, New Hampshire, New Jersey, North Carolina, Oregon, Rhode Island, Vermont, West Virginia and Wisconsin.

Montana sets the limit at 20 miles an hour. New York allows 30 miles an hour, as does North Dakota; Ohio makes it 20 miles; Pennsylvania, 24 miles; South Carolina, 15 miles; South Dakota, 20 miles; Tennessee, 20 miles; Texas, 18 miles; Utah, 15 miles; Virginia, 20 miles; Washington, 24 miles.

In practically every state that has automobile laws there is a specific requirement for reasonable and proper speed. This is construed to be less than 15 miles an hour in South Carolina, and less than 30 miles an hour in New York, North Dakota and a few other states. The rate of 25 miles an hour is deemed reasonable in nearly a score of states, while another score insists that 20 miles an hour is about right, with due care in driving. Almost every state considered designates and specifies certain conditions under which speed must be reduced far below the maximum figures. Almost every state specifies curves, bridges, crossings in this category, and many of them make it statutory to shut down when passing draft animals.



Non-skids not allowed on Michigan's crowned roads, except when snow or ice-covered

The idea of a speed limit is a difficult one to handle. It is conceivable that a speed of 40 miles an hour might not be unsafe or unreasonable in some sections, and it is absolutely certain that 12 miles an hour is wildly unreasonable and unsafe in certain other sections. The essence of the law is to protect the public, the automobilists, property and the roads, and reasonableness is the fundamental principle involved. If racing were prohibited and reasonableness insisted upon in the matter of speed it would seem that arbitrary speed limits might be abolished.

Penalties for Breaking the Laws

As regards penalizations, the range runs between a fine of $1 to imprisonment for felony, depending upon the gravity of the offense and the state in which it is committed.

In Alabama speed infractions or drunkenness may draw a fine of $500, or six months in jail, with sweeping revocations of registration and license. Arkansas makes it $100 for speeding and $200 for racing; California, $250 or 30 days; Connecticut, $500 or 30 days; Delaware, $200 or 3 months; District of Columbia, $250 or 6 months; Florida, $250 or 60 days; Illinois, $200; Indiana, $200; Iowa, $500 or 2 years; Kansas, $100; Kentucky, $50; Maine, $50 or 10 days; Maryland, $500 or 500 days in jail; Massachusetts, $100; Michigan, $100 or 30 days; Minnesota, penalty for misdemeanor; Missouri, $500 or 60 days; Montana, $100 or 60 days; Nebraska, $100 or 60 days; New Hampshire, $100 or 30 days; New York, $500 or 5 years; New Jersey, $500 or 20 days; North Carolina, $50 or 30 days; North Dakota, $50; Ohio, $100 or 30 days; Oregon, $150 or 75 days; Pennsylvania, $200 or 1 year; Rhode Island, $500 or 90 days; South Carolina, $100 or 30 days; South Dakota, $50 or 30 days; Tennessee, $100; Texas, $100; Utah, misdemeanor; Vermont, $200 or 6 months; Virginia, $10 minimum or 30 days; Washington, $100; West Virginia, $250 or 30 days, and Wisconsin, $25.

Only 6 miles an hour in Indiana when passing horse-drawn vehicle

The minimum punishment ranges down to a reprimand. In New York it is felonious under the Callan act for the driver of a car to run away after an accident. Drunkenness is construed to be vastly more serious in the driver of a car than it would be under almost any other circumstances.

The technical penalties provided for violation of the speed limits are generally severe when it is considered that speed alone is not necessarily an evidence of reckless driving. It is admitted and urged by the majority of automobile owners that the provisions against recklessness cannot be made too strong. Take the recent Glidden Tour as an example. Virginia has a limit of 20 miles an hour, and the schedule of the big cars was 20 miles an hour. It is not possible to average that rate of speed without going 30 miles an hour in favorable localities. By the same token South Carolina's limit is 15 miles an hour. If either of these laws was enforced there could never be any fast touring in either state.

In the matter of the status of local ordinances it may be said that as a general thing they are prohibited where the state law covers the premises. In many of the states the posting of signs is provided. As a general thing the laws of the various states provide speed limits which must be observed in cities and villages.

London's Horse 'Bus a Thing of the Past

LONDON, Nov. 1.—The curtain was rung down on the scene of the horse-drawn omnibus in the streets of London on Tuesday, October 31, and to some old Londoners the end was a tragedy. On the day mentioned every horse-drawn omnibus was cleared from the London roads, thus putting an end to a traffic system whose romantic reign has extended back over a long period of years in the English metropolis. The change from horse-flesh to petrol, which was inaugurated in 1904, has been even more rapid in its revolutionary character than the most sanguine prophets anticipated. The first motor-omnibus started in London ran from Peckham to Oxford Circus.

Two motor omnibuses were put upon trial at Hastings, England, to ascertain the actual running cost of such vehicles. During 1909 the expenses of the 'buses averaged 23 cents per mile each. This outlay was cut to 20 cents per mile during the fiscal year ending recently. These 'buses were not, however, of the very latest types and it is estimated that 18 cents per mile will cover the running expense of the most modern pattern of vehicle.

Lining up for the start on Broad Street in front of the office of the Newark Star

Twenty-seven Perfect in Newark Run

NEWARK, N. J., Nov. 3—In the golden sunlight of a perfect Autumn afternoon, twenty-seven of the thirty-four entrants in the Newark Star Endurance Contest drew up at the finish line with perfect scores. The run was conducted by the Newark *Star*, under the auspices of the Newark Motor Club. The route covered a 127-mile circuit through the most picturesque part of New Jersey.

Promptly at 6.45 in the morning, Mayor Haussling, the honorary starter, fired a shot from a revolver. This novel method of starting an automobile run sent off a big Mais 2 1-2-ton truck, which was followed by a Johnson 3-ton truck and the other cars. Each car carried an official observer, who kept accurate account of the time consumed in work on the car, as penalties were imposed at the rate of 1 point a minute, or fraction thereof. The rules provided penalties at this rate for every stop made outside of Newark control except at Hackettstown fuel control, where water, gasoline and oil could be obtained. If these were taken on at any other point on the route a penalty of 3 points was imposed. Each contestant was required to cover the entire route in exactly 7 hours from the time of starting under penalty of disqualification. The time for the trucks was 12 hours. For each minute early or late at the Newark control a penalty of a point a minute was incurred.

Crowds gathered to watch the cars checking in at the finish

Auburn making good time on the last leg of the 127-mile route

The first mishap of the run fell to the lot of the Johnson truck, which, in trying to avoid a stone-pile on one side of the road and a post on the other, plowed into someone's front lawn and sank in up to the hubs. After five hours' work the truck was released and proceeded, drawing up at the finish line at 1.45 a. m.

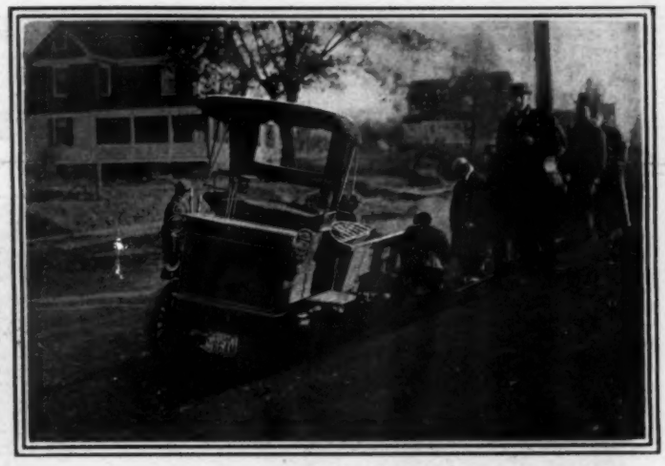
The Mais truck had no trouble until it struck a water-break at German Valley, and bent its drive shaft, which took two hours to repair. The truck finished at 9 P. M.

The McFarland No. 1 and the Jackson runabout were late in leaving the Newark control, checking out at 7.12, although their time counted against them. No. 1 became stalled on Hamburg Mountain and No. 22, a Maxwell, at Charlottesburg, on account of tire trouble. The latter was stalled on North-

As the cars approached the checking station at Newton

field road as well, the penalties for the two occasions being two points. No. 3, the Paterson, had two punctures at Newton and a blow-out at Hackettstown. This car arrived so much ahead of time that it was penalized eight points. The Cutting, No. 6, driven by Frank Kramer, the bicycle champion, was fined one point because of a stalled motor. The Auburn runabout, No. 15, was penalized two points for stopping the car near the tape. It was one minute behind time. No. 4, the Metz runabout, was fined one point for faulty equipment. The Schacht, No. 29, was fined one point for stopping the motor in Hackettstown.

Each of the cars making perfect scores received a beautiful silver cup, and each driver a handsome medal. Horace A. Bonnell, manager of the Automobile Board of Trade, had charge of the contest. The summary:

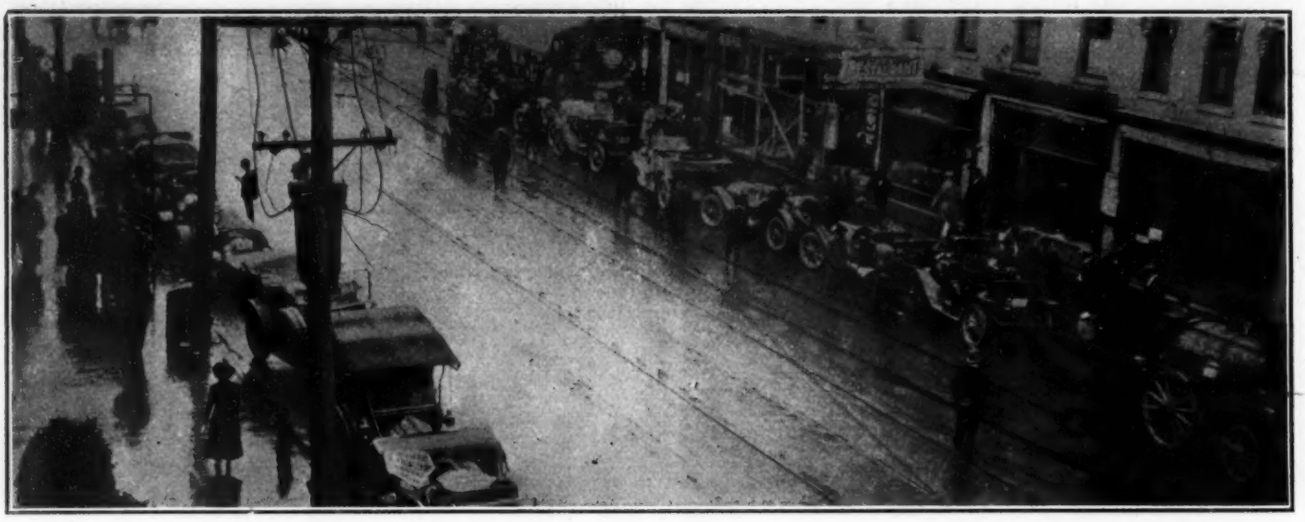


The Johnson truck was laid out early, but continued to the finish

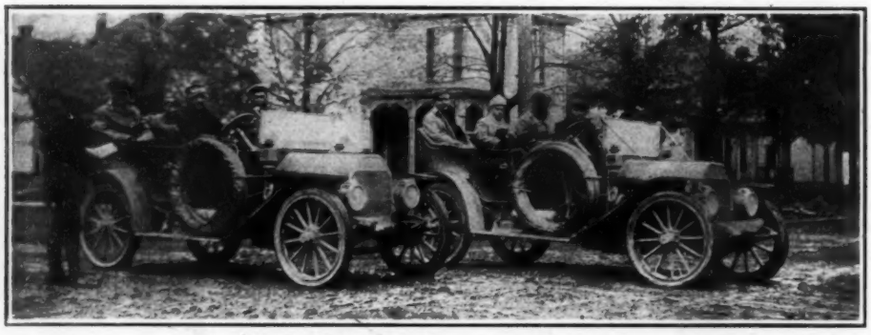
No.	Name of Car.	H.P.	Driver	Penalties
2	Jackson	30	J. D. Nicol	0
5	Ford	22	C. B. Wyckoff	0
7	Penn	30	G. M. Reynolds	0
8	Correja	35	E. G. B. Riley	0
9	Haynes	30	E. R. Schuyler	0
10	Stevens-Duryea	36	G. F. Eveland	0
11	Buick	18	Walter Davenport	0
12	Cadillac	32	C. E. Fisher	0
14	American Tourist	30	Ray Magruder	0
16	Auburn	40	J. J. Meyer	0
17	Hudson	33	R. B. Mann	0
18	Reo	30	P. Haycock	0
19	Lion	40	F. L. Apgar	0
20	Lion	40	M. H. Apgar	0
21	Maxwell	36	J. W. Mason	0
23	E-M-F	25	L. F. Pfeifer	0
24	Ford	22	R. E. Gillam	0
25	Flanders	20	M. H. Jolly	0
26	National	40	H. C. de Raismes	0
27	Cole	35	J. B. Wallace	0
28	Premier	40	Herman Peterson	0
30	Oakland	30	Thomas Buchner	0
31	Correja	35	F. J. Rodel	0
32	Washington	40	H. O. Carter	0
33	Lion	40	R. C. Clements	0
34	Oakland	30	C. J. Maier	0
35	Herreshoff	22	L. J. Blanchard	0
1	McFarland	40	Thos. McGuire	1
3	Paterson		M. F. O'Neil	8
4	Metz	22	W. H. Samuel	1
6	Cutting	32	F. L. Kramer	1
15	Auburn	30	Peter Dexheimer	2
22	Maxwell	25	C. F. Briggs	2
29	Schacht	40	J. M. Gray	1
48	Johnson—3-ton truck	40	V. Richardson	Dis.
50	Mais—2½-ton truck	35	C. Robertson	Dis.

The Schooley Mountain district offered magnificent views—showing the Oak Ridge Reservoir and the excellent road

Molines, Staver and Grout Winners



Scene when the contestants in the reliability run of the Chicago Motor Club stopped at the noon control at Lexington, Ky.



Moline team in touring car class—No. 2 clean score

CHICAGO, Nov. 5—That automobiles are being made better each succeeding year is well demonstrated by the performances of the seventeen cars that contested in the 7-day reliability run of the Chicago Motor Club which endd in this city this evening. Of the seventen cars that started in the run nine reached Chicago to-night with perfect road scores.

A perfect road score meant that the car had traveled on its 20 or 18-mile-per-hour schedule during the run and that no adjustment had to be made on the car during the road work. Two or three years ago it was a wonder if one car made a perfect road score, but to-day under stricter rules over 50 per cent. of the cars have ended with clean scores for the road work. This is what appeals to the car owner, for what owner wants to be held up along the road for any car troubles? He does not mind having to make some little repair in his garage at the end of the day's run, but does object to having to stop in the middle of a muddy road or on a city street to make such a repair.

But the winners of perfect road scores did not necessarily mean winners of the contest. After the road work was over each car had to take its brake test, its clutch test, its motor test and was given a technical inspection of one-half hour in which every broken, bent or loose part on the car was looked for and penalties, according to the fixed penalty rules of the American Automobile Association, imposed. After it was all over two cars were tied for the touring car trophy and a winner was declared in the runabout class. A Moline and a Staver tied in the touring car division. Both had perfect scores on the road, perfect scores in the brake test, perfect scores in the clutch and motor tests and perfect scores when the technical inspection was completed. They share equal honors and each will receive a trophy. Salisbury drove the Moline which carried No. 2 banner and Knudsen drove the Staver which was No. 10 in the test.

In the runabout division another Moline was the winner. It was driven by J. A. Wicke, who has piloted cars of this make in several Glidden tours and in previous runs of the Chicago Motor Club. He had a perfect road score, passed perfect brake, clutch and motor test, but lost 4 points in the final inspection. He had a water leak at the top of the radiator where the return pipe to the motor is attached to the upper tank part of the radiator. The victory gives to his company the Van Sicklen trophy put up a year ago and which trophy has to be won three times before becoming the permanent possession of the winner. Last year the Moline tied with the Fal on this trophy and by the agreements then made the possession of the trophy for the first year was to be determined this season. As the Fal was not a contestant in this run, the winning of the trophy for last year goes to the Moline by default. The Moline now has two legs on this trophy.

In the touring car division there were nine contestants and in the runabout class, eight, the complete penaliziations for road-work, brake tests, clutch and motor tests appearing on the opposite page.

In addition to the winners of the touring car and runabout

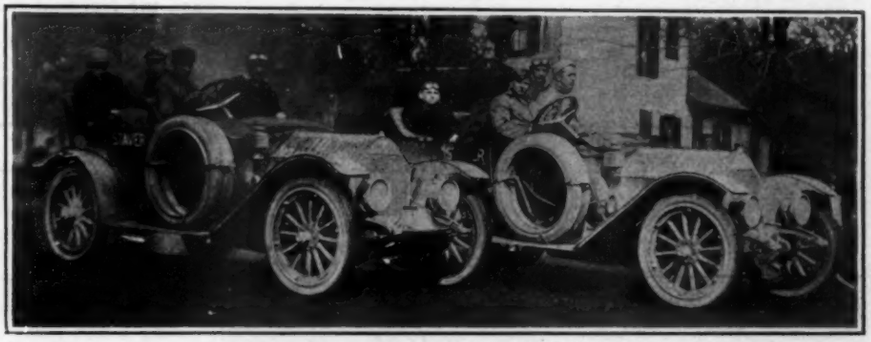
TABLE SHOWING THE RESULTS OF THE FIFTH ANNUAL RELIABILITY CONTEST OF THE CHICAGO MOTOR CLUB.

No.	Car	Driver	1st Day		2nd Day		3rd Day		4th Day		5th Day		6th Day		7th Day		Brake Test				Final Examination			Final Inspection	Grand Total Technical and Time Penalties	Economy Competition				
			Time	Work	Time	Work	Time	Work	Time	Work	Time	Work	Time	Work	Time	Work	Total Road Score	Service	Emergency	Total Penalization	Clutch	Gearset	Motor Test			Position	Gasoline in Gals.	Weight	Miles per Gal.	Percentage
	Touring Car Division																													
2	Moline	F. G. Salisbury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	30	0	0	0	0	0	0	2	77½	3740	17.48	378
10	Staver	E. T. Knudsen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	33	0	0	0	0	0	0	3	82	3900	16.54	371
1	Moline	C. H. Vandervo't	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	30	0	...	...	...	4	4	7	82	3750	16.54	357
5	Halladay	Geo. H. Daubner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	22	5	0	0	0	16	21	10	105	4280	12.90	311
3	Case	J. Hanson	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	45	40	0	0	0	0	22	26	11	103½	4090	13.10	308
9	Staver	G. Monckmeier	0	0	0	0	0	7	0	0	0	5	0	0	0	0	12	38	68	18	0	0	0	5	35	5	81½	3790	16.63	363.305
6	Halladay	W. M. David	0	0	0	0	0	0	14	0	0	0	0	0	0	0	14	97	39	49	0	0	0	8	69	9	102	4260	13.29	326
7	Oldsmobile	C. R. Winters	0	0	0	0	0	0	238	217	0	2	0	0	0	6	463	27	35	0	0	0	0	26	489	14	210½	6030	6.44	223
8	Abbott-Detroit	A. M. Robbins	0	0	0	0	0	0	0	0	0	0	48	70	1000	...	1118	Wi	thd	r'n	0	0	0	...	.....	...	....	.....	.....	.....
	Runabout Division																													
100	Moline	J. A. Wicke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	28	0	0	0	0	4	4	8	84½	3750	16.09	340.3
102	Oakland	H. A. Bauer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	28	0	0	0	0	7	7	12	94½	3340	14.38	276
105	Bergdoll	Ad. Monsen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	49	0	0	0	0	7	7	6	74½	3450	18.25	363.3005
103	Velie	A. H. Gibbons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	53	3	0	0	0	20	20	13	113½	3620	11.92	250
104	Velie	J. H. Stickney	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	61	46	11	0	0	0	41	53	15	137	3490	9.90	199
101	Moline	W. J. Boone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	30	0	5	0	0	54	54	4	81½	3830	16.69	368
107	Grout	H. E. Halbert	0	0	0	0	2	40	92	248	0	0	50	3	30	8	473	63	40	13	0	0	0	8	499	1	77	4010	17.60	406
106	National	Paul Strous	0	3	14	13	0	0	0	0	0	0	11	0	1000	...	1041	Wi	thd	r'n	0	0	0	...	.....	...	....	.....	.....	.....

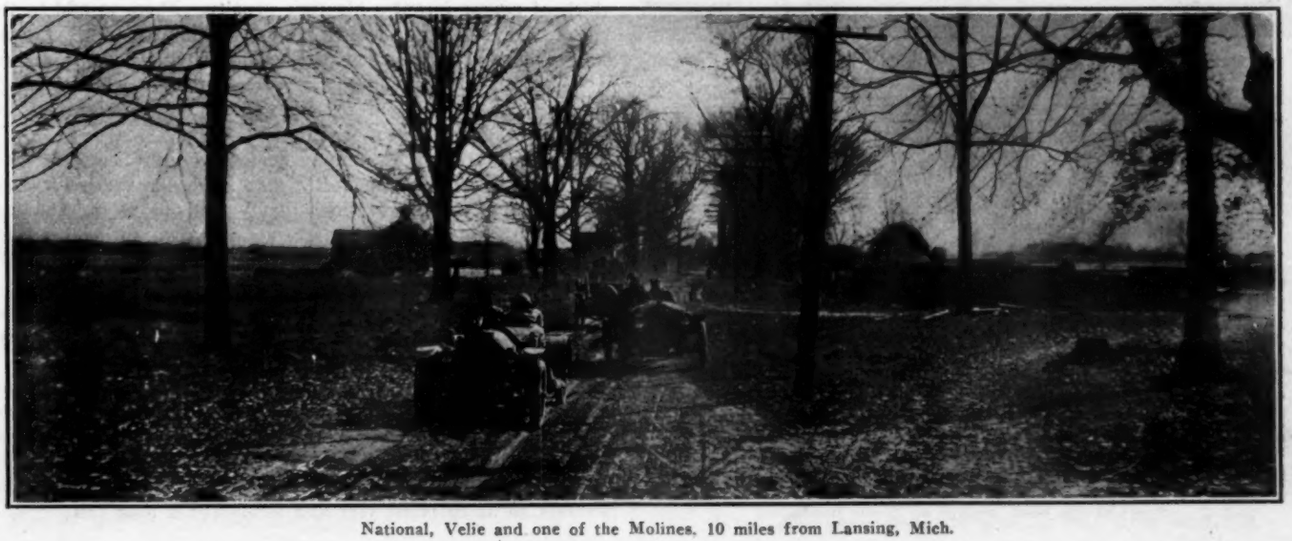
divisions there were two other winners. The first was the winner of the team trophy, a team consisting of any two cars of the same make whether in the touring car or runabout divisions having the lowest score. The winning team is made up of two Molines, Salisbury with a perfect score and either Van Dervoort or Wicke, with 4 points each, making a total penalty of 4 points for the team.

The fourth trophy was the economy trophy carried off by No. 107 Grout, driven by Halbert. This trophy was donated by the Standard Oil Company and was won outright. It was given to the contestant showing the best efficiency performance under the economy formula of the club. This formula takes into consideration the weight of the car, the distance traveled and the gasoline consumed. The product of fuel used and distance traveled is divided by the weight of the car. In this formula it does not necessarily follow that the car making the trip on the least gasoline is the winner; in fact, Bergdoll used a few gallons less than the Grout, but was several hundred pounds lighter.

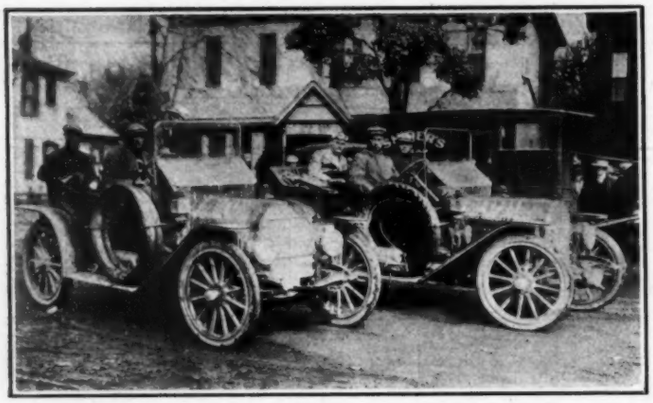
All these results were not reached without a process of elimination. First, there came the long tour itself, a journey of 1355.7 miles through five States, with night stops at Indianapolis, Louisville, Cincinnati, Columbus, Detroit and Grand Rapids, which eliminated eight of the cars. Then came the brake and clutch tests Saturday morning, which still further reduced



Staver team in touring car class—No. 10 clean score.

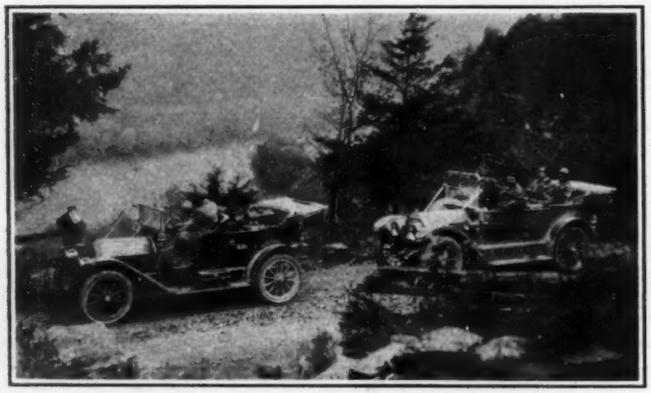


National, Velie and one of the Molines, 10 miles from Lansing, Mich.



Moline roadsters—No. 100 won first place in its class

Abbott and two Molines 10 miles out from Georgetown, Ky.



Pilot Velie and Oldsmobile, 15 miles out of Louisville

Scene at the noon control at South Bend, Ind.

the field, while the technical examination as conducted by F. E. Edwards, George W. Gaidzik and supervised by David Beecroft, completed the task of evolving the winners.

To the Moline belong the chief honors of the long contest, for in addition to tying for the touring car cup and winning the Van Sicklen trophy in the roadster section and taking the team prize, all four Molines went through with perfect road scores. Three of these were penalized in the technical examination. Van Dervoort's No. 1 Moline was given 4 points for a loosened radiator support. The Wicke Moline roadster also drew 4 points for a leaky radiator union, while the Boone Moline roadster was given 54 points for a broken starting crank bracket and a loose radiator support.

The Staver-Chicago came into the limelight through the fine work of Knudsen, who not only had a perfect road score but also handled his car so well that the technical committee could find nothing wrong when it was subjected to a rigid test. The other Staver was sixth in the final rating, its main trouble being a front wheel bearing which cost it its road score and brakes in that test.

Halbert in the Grout started in the test with the idea of winning the Standard Oil Company's fuel economy trophy, which last year was taken by the Cunningham. The Grout was a class winner in the Chicago economy test last Spring and Halbert was out to repeat. After he lost his perfect score the second day he devoted all his time to saving fuel, with the result that he put his big roadster through the run on a fuel consumption of 77 gallons. This was a trifle more than was used by the Bergdoll, but the weight of the Grout enabled it to top the list.

When the tour was completed it was found that perfect road scores had been made by No. 2 Moline, No. 10 Staver-Chicago, No. 1 Moline and No. 5 Halladay in the touring car class and by No. 100 Moline, No. 101 Moline, No. 102 Oakland, No. 103 Velie and No. 105 Bergdoll. Of the others, the Abbott-Detroit and the National roadster did not finish, the former withdrawing at Niles, Mich., the last day, because of the broken spring, while the National roadster overshot a turn near Hobart and was stuck in the sand, being left there over night by its owner, Paul Strauss, who was satisfied to seek shelter in a neighboring farm house.

Notwithstanding the fact that only two of the cars went through the entire contest with perfect scores, both road and technical, the results of the trial are something of which the entire motor industry may be proud. Most of the penalties were brought about by spring troubles, and in two instances the elimination can be traced entirely to accidents. The Oldsmobile Autocrat was running perfectly until a gasoline connection sprung a leak going into Washington Court House last Tuesday. This necessitated taking off the body to repair the damage, which of course meant a big time penalty. Then, to add to the misery, the big car, while leaving Washington Court House, skidded passing a team and dropped partly into a ditch, getting in a position where it could not secure traction which made it necessary to get a team to climb out. This brought on the bulk of the Oldsmobile's penalties.

With the Case it was running perfectly until leaving Detroit. Avoiding a woman getting off a street car, the car hit a curb, which resulted in penalizations that put it out of the running. The big Abbott-Detroit can trace its fall to a spring breaking while inside the city limits of Cincinnati. Dan Boone probably would have gone clean with his Moline had it not been for a weak dry cell which made trouble for him while starting on Wednesday. Boone cranked so hard he broke the starting crank bracket.

Another source of trouble was caused by broken fender irons, several being penalized for loose fenders and broken brackets. It is figured that some make mistakes by drilling holes in the fender irons, which weaken these parts and cause breaks. Instead of drilling holes, it is suggested to clamp irons to the brackets so as to resist jars and strains of a long run.

Brakes also caught some, but it is a remarkable fact that the report shows that on every car so penalized that one of the brakes was working well. Six caught demerits here. Where one brake was holding well the other was not so good.

Turning to the other side of the picture, one finds that not a single case of engine trouble developed among the seventeen cars on the 1355-mile journey. Every engine was hitting on all four cylinders in the motor test Saturday morning, despite the severity of the run. The National was penalized for carbureter adjustments and perhaps some might claim this to be engine trouble, but here there are extenuating circumstances. Strauss, driver of the National, is the owner of the car, and this was his first contest. In starting from Chicago he discovered the carbureter was not set for those conditions, and he had to change it three times before the engine ran right.

Not a case of axle trouble was reported. Before the run started the technical committee examined each car, taking the measurements from the felloe of the front wheel to the felloe of the rear one at the ground, and allowing 1-4-inch variation. Looking over the axles at the finish of the run it was found that each trimmed to 1-16 inch. No case of a broken wheel was reported, whereas in previous tests it was discovered that there were weaknesses. No leaks in radiator construction were unearthed, Wicke's penalty being for a leaky connection.

If the Chicago Motor Club had tried to order varying weather and road conditions in order to give the cars a test that would include everything in these categories it could not have succeeded better. As far as Indianapolis the weather was balmy and roads good. Then it sprinkled from Indianapolis to Louisville, although the stone roads were so good it made little difference. Going from Cincinnati to Columbus the roads were heavy because of rain, and the weather cold and disagreeable. From Columbus to Detroit there was a stretch of road that should make the States of Ohio and Michigan ashamed of themselves. From Toledo to Detroit the going was so abominable that it was necessary to change the routing.

From Detroit to Grand Rapids the weather was cold and the skies cloudy. The roads, too, were not of the kind found in southern Indiana and Kentucky, but still not so bad as to worry anyone. It was on the final day of the tour that the prize package was delivered. Leaving Grand Rapids under a cloudless sky, but with the temperature so far down that the tourists were in danger of being frostbitten, the tour had not gotten more than 20 miles out of town when traces of snow were discovered. The farther the tour progressed the deeper became the snow until the climax was reached at Niles, Mich., where an 18-inch snowfall was encountered. The conditions somewhat resembled those that attended the running of the New York-Paris race. This snow belt, however, disappeared in the afternoon, and the last traces were lost at New Carlisle, 45 miles from Chicago. From that point into Chicago the cars were kicking up dust and the weather had moderated so that the trip really was enjoyable. It was hard getting into the city because south of Gary the old Hobart road was torn up, making a detour necessary, while the usual course from Gary into East Chicago was blocked, making it necessary to go to Hammond before straightening out for the dash for the last tape.

The tour from Columbus Wednesday morning to Chicago Friday night saw the elimination of only two of the cars that had perfect scores up to that point, and those two dropped the same day, Thursday, going from Detroit to Grand Rapids. The Abbott-Detroit lost out when a gasoline line clogged and on top of this came the spring trouble which had started in Cincinnati. The Case was put out in Detroit, when it encountered the street car incident. On Wednesday the No. 9 Staver and No. 7 Oldsmobile were penalized 5 to 2 points, respectively; on Thursday the Case drew 4 points, the Abbott-Detroit 118, the Grout 53 and the National 11. On the last day the Oldsmobile drew 6 more points and the Grout 38, while the Abbott-Detroit and the National withdrew.

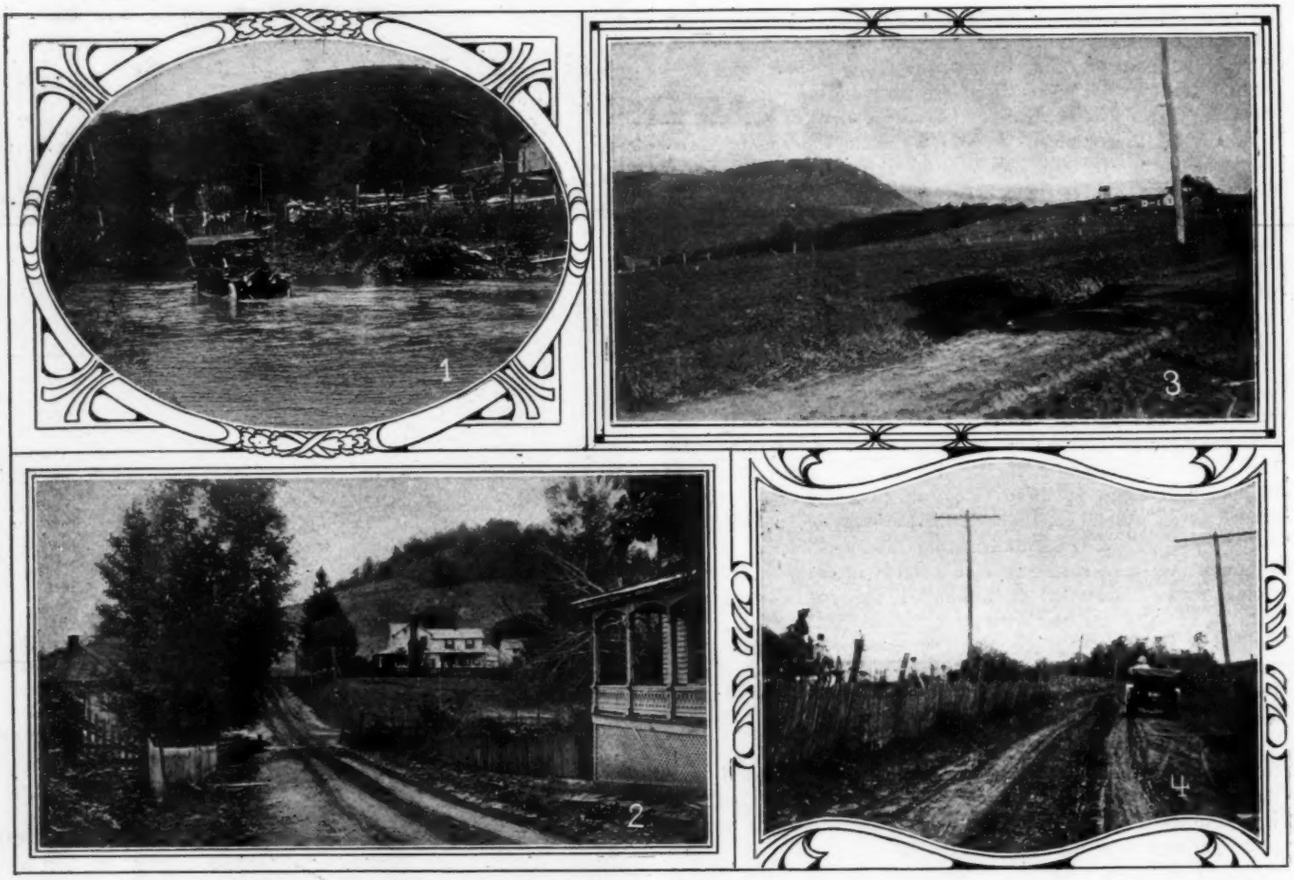
Grout No. 107, winner of the economy test

Stretch of excellent road outside of Dayton, O.

Oakland, No. 102, which tied for second place in roadster class

Stopping to put on chains, 30 miles out from South Bend, Ind.

Road Conditions Truly Indicate the



1—Back Creek will long be remembered by the Glidden tourists
2—Near Fairfield the road looks better than it is in reality
3—Leaving Roanoke the road is largely red clay and generally rough
4—Rough spot near Midway, but vastly better than it is a mile ahead

CERTAIN portions of the so-called National Highway are jokes and most of the imitations of roads included in the main Eastern route to the South are located in Virginia. On the other hand some of the best stretches of road between New York and Jacksonville are also in Virginia. Therefore, a ride across the Old Dominion involves all the pleasures and pains ordinarily to be met with on an automobile tour and many that come under the head of extraordinary.

There are miles and miles of fine macadam, stone roads and excellent dirt highways; there are also many miles of clay road, fair in dry weather and all but impassable when it is wet; dozens of miles of excessively rough and uncared for road; two score fords of varying width and depth and a score of toll-gates.

Speaking of the latter it may be said that the toll-gates are thickest where there is the least apparent reason for them as judged by the character of the roads. This, however, is a well-known characteristic of toll-roads.

In preparing for a run through Virginia, the tourist would do well to provide an ample supply of anti-skid chains, the same being not less than six chains, so that if bad weather should intervene he will not have to abandon his car in the hills and proceed by train. He might have to do it anyway if the fords happen to be unusually deep.

The improved section of the highway across the State is mostly north of Staunton. The worst parts of the road are south of the Natural Bridge to within 8 miles of Roanoke and south from Roanoke to the North Carolina line. A good part of these roads was built by General Greene in the Revolutionary War period and slightly improved by Stonewall Jackson and General Lee in the Civil War time and shows few traces of improvement since. In the poverty-stricken mountain section, where the people live by hunting and nutting, raising only enough razor-back pork and garden truck to supply their own excessively simple needs, the roads do not warrant the name.

Wherever the roads are good in Virginia and as a general proposition, elsewhere, the people are prosperous, intelligent and thrifty. Where they are bad, opposite living conditions obtain.

The difference between the country people of the Shenandoah Valley and those of the Roanoke Valley is startling. In the Shenandoah the farmers and horticulturalists raise as fine apples and fruit as can be found anywhere on earth. The members of the recent Glidden Tour sampled the produce all along the line from New York to Jacksonville and they unanimously award the palm for fine apples to the Shenandoah Valley. In the Roanoke Valley, outside of, and entirely separate from, the big, busy, thriving city of Roanoke, the condition of the people is lamentable. When the caravan passed their way, the only glimpse caught of the mountaineers was when the cars traversed some cross-road and for a fleeting moment the tourists saw groups of lanky, uncouth men, usually mounted and universally carrying long rifles strapped across their shoulders. Some of them were questioned and it was learned that little or no agricultural produce

Measure of Virginia's Prosperity

5—The Shenandoah Valley presents scenes of pastoral beauty
6—Near Rocky Mount—a typical section of the best roads in the locality
7—Little Chestnut Creek is likely to cause trouble in wet weather
8—Roads are generally good entering and leaving Virginia cities

was grown for market and the chief sources of income were the chase, guiding parties of hunters and seeking wild nuts in the woods. Education is a negligible quantity and physical attractiveness is wanting. Needless to say, the roads through this section are horrible.

Virginia, nevertheless, understands the value of good roads and paradoxical as it may seem, the State and counties have done an immense amount of work toward securing them. Just what progress along this line has been made can only be appreciated if one made a trip through the State several years ago and then again this Fall, noting the differences and improvements.

It is 109.8 miles from the Virginia-West Virginia line to Staunton, following the route of the Glidden Tourists. The road enters the Old Dominion 2 miles south of Rippon, W. Va. Almost the first thing the tourist will notice is a small ford, just across the State line. This could be bridged with a stone culvert at little expense and to the great advantage of users of the road. The road surface is good, being composed of stone base and fairly well maintained. There is another ford a little further on that should be bridged and then the tourist comes to the first toll-gate. Berryville, a place of 1,000 inhabitants, is the first settlement to be reached in Virginia.

Every foot of the country south from this place was battleground during the Civil War. Each hill was the scene of a fight; each valley was once the stage setting for war in its most terrible form. Even the toll-gate just outside Berryville was once the center of a wild struggle between Mosby and Custer.

The road continues good, despite the toll system for many miles. The road corporations, in which it is said that the State of Virginia is a large shareholder, are chary about spending good money in bridging fords and water holes, but there is evidence that much work has been done to keep the roads in good condition.

Winchester, lying at the gate of the Shenandoah Valley, is rich in historic association. The town and its tributary section are also rich in almost everything else that goes to make up the sum total of human well-being except that it has no real hotel. The people of Winchester are all associated with agriculture in one way or another and as intelligence has been applied to the pursuit of agriculture in this territory, everybody has money and the town and territory own nearly 1,000 automobiles.

From Winchester to Staunton the tolls amount to $4.75 and except in spots roads are good enough. Through the battlefields of Winchester which were taken and retaken seventy times, according to local lore and historic record, the road traverses Cedar Creek, Fisher's Hill and Newmarket, all of which witnessed sanguinary struggles and the road itself was followed by General Sheridan when he made his celebrated ride from Winchester to the point 20 miles away where his troops were being crushed by the gray legions.

The way leads through Kernstown, Stephens City and Middle-

One would hardly expect to find such a scene near Harrisonburg

town to Strassburg, and skirting the hillside of the mountains to the East, passes along the North fork of the Shenandoah river through Tom's Brook, Maurertown, Woodstock, Edinburg, Hawkinstown and Mount Jackson. The stone pike is fine all along here, but upon approaching any of the little towns and villages it will be noticed that the road becomes very rough and in passing through the towns, there is little evidence of an improved pike. This is particularly true after getting South from New Market and Lacey Spring and approaching such places as Harrisonburg.

Harrisonburg is a funny little village. The land about town is poorer than the average in the Shenandoah valley and the people are on a par with the land. It might almost seem as if the treasury was bare and that not a cent more could be wrung out of the natives by the ordinary processes of the tax-collector. Outside of the fact that the road entering Harrisonburg is worse than it is anywhere in the valley, making fast progress a physical impossibility, a small, non-assertive sign at the town limits states that the speed limit is 8 miles an hour. It is probably within the realm of possibility to drive 12 or even 15 miles an hour if one cares nothing for his car. The spirit of Harrisonburg was delightfully displayed when the Glidden Tour passed through.

A large thick individual, wearing a black beard and dressed after the mountaineer style, deftly placed his hat over the warning sign when the first car came along. When six or seven cars had passed, this fellow sought a telephone and advised the officials at the next toll-gate to hold up the caravan.

Winding country road near Greenville—this is full of small bumps

It is possible that some of the cars did make 10 miles an hour in going through town and later their drivers had to pay the fines assessed. Harrisonburg was richer by the sum of $39.45 as the net result of the tour.

Mount Crawford, 6 miles to the south, also has an unenviable reputation but none of the tourists were stopped or fined.

From Mount Crawford to Staunton, the stone pike is good.

Staunton, which is pronounced as if it did not have a u in its first syllable, is a prosperous, lively and progressive place, of about 12,000 inhabitants. It is quite an educational center and is the home of the Staunton Military Academy and various female schools. Its attitude toward publicity can be accurately gauged from the single circumstance that when the Glidden Tour rolled into town, it was greeted by the paraded cadet corps of the military school at Present Arms. Staunton owns a large number of automobiles and is not in any way in sympathy with the attitude of such places as Harrisonburg.

The mileage from Staunton to Roanoke is 90.8 and it should only be essayed after a dry spell of weather. The road out of Staunton is excellent macadam for nearly 5 miles, being succeeded by rough dirt roads, that are not bad in dry weather. The road begins to climb immediately after leaving Staunton and in the first hour, the huge bulk of the Blue Ridge begins to loom in prospect. But after passing Greenville the road improves and

The back-bone of the Blue Ridge makes progress slow and uncomfortable

there is ample evidence of considerable highway work. This is particularly noticeable in the reduction of grades and straightening of the road just outside of Greenville.

The first dose of clay is encountered south of Midway and from there to Fairfield and Timber Ridge, high in the hills, the way would be uncomfortable in wet weather. There has been considerable grading, cutting and draining in the construction of the road from Timber Ridge into Lexington. This quiet university town is the seat of Washington and Lee University and the Virginia Military Institute and is proud of the fact that the bodies of Generals Lee and Jackson rest within its borders. An intensely interesting half hour may be spent in seeing the tomb of Lee. After the Civil War, General Lee was elected president of the university and died in 1870. His body rests in a chapel on the campus, furnished with so much plainness that it tells the story of the South's poverty after the war with wonderful distinctness. In the sanctuary of the chapel there is a full length figure of the great soldier, lying at rest, attired in the uniform of a full general. In the crypt, where his body actually is buried, a candle burns on the stone floor in front of the masonry that contains the clay of Lee.

Leaving Lexington, there is a good macadam road for 4 miles after which follows 7 miles of the roughest highway of the trip. The summit lies only a short distance from the end of the

macadam. From the high point the road winds up and down between the hills which narrow the valley almost to the size of a canyon. Then comes 5 miles of good macadam which brings the tourist to Natural Bridge. From the road, Natural Bridge is a disappointment. In fact it can not be seen at all, but by paying $1 a head, tourists may stop at the hotel located there and walk down below the bridge. It is a great hollow cut in the limestone by water action and the arch is high enough to contain a skyscraper building.

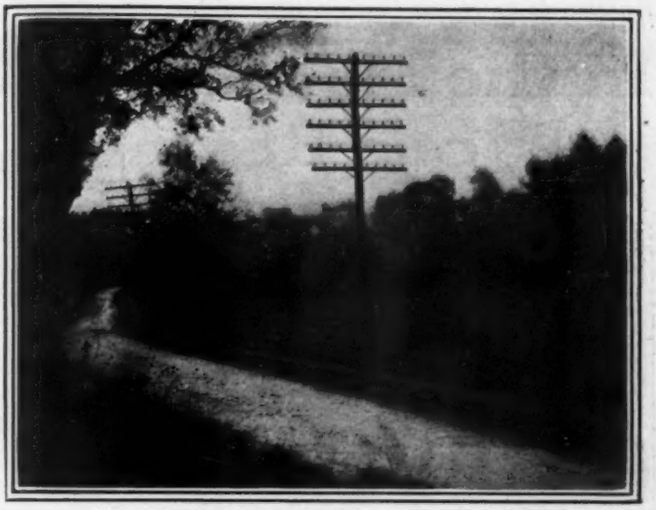
There is a tremendous down-grade immediately after leaving the bridge and extending spasmodically to Buchanan, where the road crosses the headwaters of the James river. This road is graded in sections but otherwise unimproved. It is classed as a dirt road but in reality it is red clay, mixed with native earth and in wet weather is so slippery that a pedestrian can barely stand upon it. Woe be unto the automobilist who is obliged to change a tire in a rainstorm thereabouts. Nobody has yet shown the nerve to erect a toll-gate on this stretch of road. Purgatory Mountain has been robbed of most of its terrors through the improvements that have been made in and close to the village of Buchanan. In dry weather the foregoing stretch of road is generally passable at very moderate speed. In wet weather the tourist takes his life in his hand when he attempts it.

Magic scenic effects are presented panoramically in the Shenandoah

From Buchanan to Cloverdale the going is fair and from Cloverdale to Roanoke, a matter of 8 miles, there is a splendid macadam road that winds dangerously around numerous hillocks into the city. While some of the Glidden cars made as high as 58 miles an hour in the terrific rainstorm over this particular stretch of road, the dangers of high speed, even in dry weather, will be very apparent to any tourist.

For 40 miles south from Roanoke, the roads are indescribable in wet weather. But if there has been a dry spell of a week or more the scenic grandeur in which they are set would repay the suffering they must cause to automobile tourists in passing over them.

Circling Mill Mountain, one of the show spots of the section, the road mounts a stiff grade through red clay for about 5 miles, where a heavy down grade is met. At the bottom of this grade is found the left fork of the Roanoke River, known locally as Back Creek. If there has been rain in the hills the night before, beware of Back Creek. It was here that nearly half of the Glidden Tour stalled impotently while the swirling water hummed merrily through the under-pinning of the cars after short-circuiting the magnetos. Such treatment is outrageous for as useful and valuable a bit of mechanism as an automobile and the effects of the flood were apparent in the Glidden caravan all the way to Jacksonville.



One of the few stretches of improved road near Lexington

After getting across this ford, which could be bridged permanently for a comparatively small sum, there is a steady climb for 5 miles through mountains that rival anything in the world for scenic effects.

The poorest country passed during the trip will be found immediately after reaching the summit. Houses are unpainted, children clothed in calico and without foot covering and a general air of unthrift and lack of purpose. The roads are unimproved and through the hills to Martinsville are a fierce trial to car and passengers. Fords and gullies follow one another in rapid succession and the impossibility of regular wagon traffic over the roads in their present condition was the most salient fact impressed upon the Glidden tourists in passing.

At Martinsville there is a considerable improvement and for the remainder of the 75 miles that lie between Roanoke and the North Carolina line the road grows better with the passage of each mile. There are a number of stiff grades but the fords in this section of the road have been bridged and there is ample evidence of more wealth, intelligence and industry than appears a little further north.

The road through Virginia is 276.3 miles long. At least 75 miles of this is unimproved and unfit for travel during wet weather. There are thirty-seven fords of various sizes ranging from that across Back Creek to small runs that barely wet the tires in passing. Besides these things it must be acknowledged that the pike through the Shenandoah Valley makes good riding in comparison with the rest of the trip.

Leaving Timber Ridge, the highway is excellent for a short distance

In the Making of a Radiator

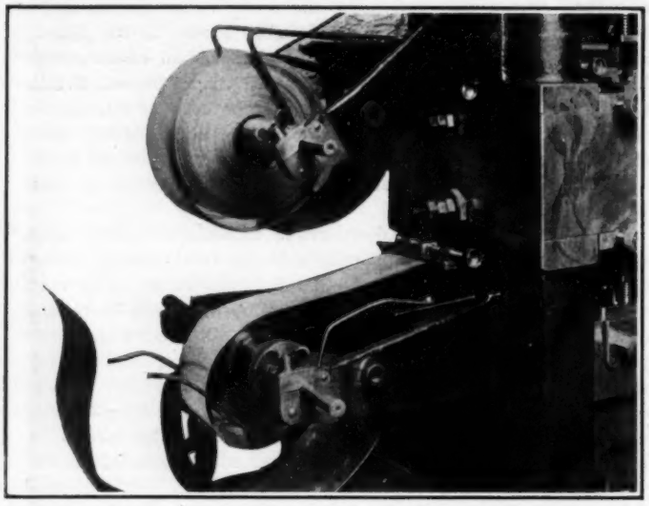
THE Livingston radiator is of the zigzag tube type. The water enters the top of the radiator, according to the usual custom, and passes through the various tubes until it reaches the bottom, whereupon it flows into the water outlet pipe and into the cooling water inlet of the engine. The shape of the tubes is peculiar and gives the water a very devious course as it flows on its way. Each tube is of the same width as the radiator and of such a shape that the water passes through a distance equal to double the length of the radiator from top to bottom. This is effected by the water having to pass alternately through a horizontal space of tubing equal in length to each vertical space through which it passes. The tube consists of a number of unclosed squares, the lower side of each forming the upper side of that next below it.

A series of these tubes placed alongside of one another gives the effect of a honeycomb. The air is drawn through the open spaces between the tubes and cools the water which passes through them.

Simplicity and speed feature the manufacture of this radiator. The raw material is transformed into the finished product by a series of operations which progress step by step with as little lost time or effort as could be possible in a process of manufacture which involves the various progressive steps toward the completion of the work.

The bronze of which the radiators are made comes to the factory in rolls of different widths, which are used according to the purposes for which the radiator is required. The sheets of bronze are placed upon a spindle of a machine which is adapted to carry any size roll required. Below the spindle carrying the first roll there is a spindle which carries another roll of bronze which is slightly wider, for a purpose which will be seen later. The metal passes from the roll into the machine and is led through guides into a space in which there is a die.

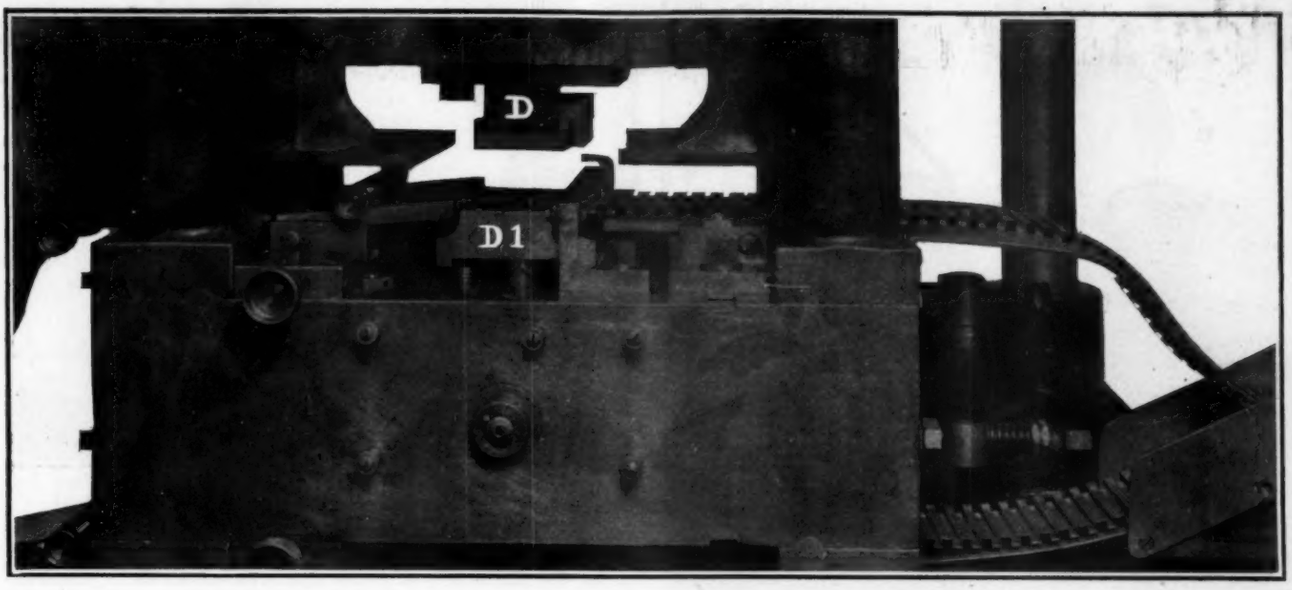
As the metal is fed to the machine the die rises and falls, the die for the upper roll being entirely separate from that which operates the lower. The dies crimp the metal and corrugate the crimps, which are square in shape. After having passed the die the bronze is carried along in its corrugated form until it passes out of the first part of the machine into a guide which is so arranged as to bring the two strips together before they pass to the second series of operations, which is carried on by the same machine as contains the die. The strips having been brought together so that the upper and lower pieces fit into each other, with the square crimps in mesh, they are led into a block which contains the mechanism for firmly joining them together.



Stage 1—The raw material entering the crimping machine

As the lower strip passes into the reach of the tool it is cut at the ends so that a flange is formed. It is for the purpose of forming this flange that the lower strip is wider than the upper. The next operation bends the flange up slightly. The other tools then turn it over and clamp it tight. The corrugations in the base of each of the crimps are arranged so that they are opposite to each other, thus leaving an open space between them for the easy circulation of the water. The two strips when fastened together form one of the tubes of the radiator. Another purpose of the small corrugations is to aid in the easy expansion and contraction of the metal without fear of damage to the fastenings of the tubes or of the bursting of the metal itself.

Stage 3—Cutting the clamped tubes to their proper length and placing them in a box of the correct width



Stage 2—The strips of metal passing through the corrugating and crimping dies. The strips flow together as shown

After having been crimped, corrugated and joined together the two strips pass on as one tube to the next operation, which is to cut them into lengths as required for the particular radiator which is being made. The length to which each tube is cut is equal to the extreme depth of the radiator from top to bottom; that is, the tubes are all cut to the same length as the longest tube in the radiator. A tube which has been cut off forms a guide for the length of those cut, so that after each length is cut off it can be placed in the box which is made for the purpose of holding them as they are cut off.

The boxes are so constructed that they are just wide enough for each radiator, and after they are filled there is enough tubing in them to make the radiator required. When the tubes are put in the box they are watched to determine any inaccuracies which may have accidentally found their way into the cutting or machine work. These inaccuracies will be very easily determined by a variation of the straight line which should be formed by placing the tubes upon each other in the box. After the boxes are filled the first series of operations is finished and they are transported from the machine room to the next stage in the work which consists in shaping the sections and soldering them.

Stage 4—Cutting the tubes to conform to shape of frame

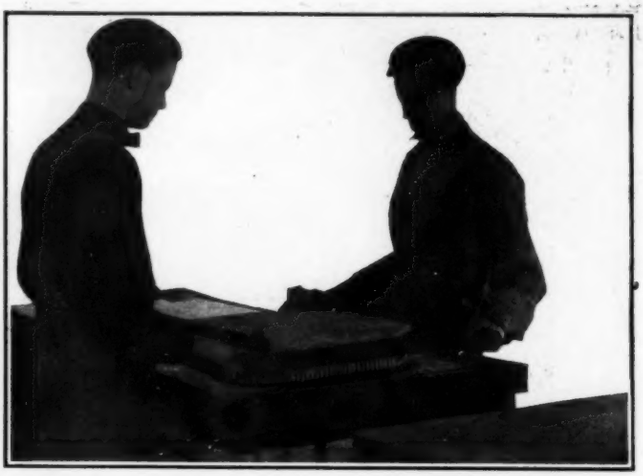
When the box with the set of tubes arrives at the bench at which the work of shaping the radiators is carried out, the tubes are removed one by one and compared with the frame into which they are to fit. This will give the proper length of each tube, and it is cut accordingly. After having carried out the operation of cutting the tubes for a given type of radiator shape for a short time, the operator becomes so familiar with his work that he will know whether there should be a variation of one or two squares in the length of the succeeding tubes in order to secure the required shape. In the case of a radiator which is square, such as is used occasionally on trucks, there will be no cutting required.

After having been cut to the proper form the tubes are placed as they are to go into the radiator frame and set up on a slab from which project a series of pins. The tubes are set upon the slab, being held in their exact relative positions by the pins. A strip of brass tapered much in the form of a knife blade is then called into use for the purpose of opening the ends of the pipes which may have been closed by being passed through the various stages of the work. The top and bottom of each tube will have to be opened in this manner so that the water will enter into all of them equally in passing from the top of the radiator to the bottom. A full use of all the cooling space available will not be had unless these ends are properly opened.

When the tubes have been set upon the slab correctly and the ends of the tubes opened the section is ready to be soldered together. In order to do this as expeditiously as possible the pin frame is attached to a small electric traveling crane which runs along a beam above the table upon which the frame rests while the sections are being placed upon the pins. A single chain hangs from the crane, carrying a hook which may be seen by referring to stage 5. This hook engages with the chain which holds the frame. The frame chain is spread apart by a brace so as not to interfere with the free operation of the crane. When the work of opening the ends of the various tubes is completed the frame is lifted above the table by the crane and two men run it along the table, the whole frame traveling very easily since the wheels of the crane run freely on the track. When the end of the table is reached the framework with its section pinned to it is seized and given a turn so as to bring the frame in a reversed position; that is, with the section of tubes hanging down from the frame, as seen

Stage 5—The cut tubes are placed in the frame F and held by pins P
Stage 6—Soldering the ends of the section to hold the tubes together

in stage 6. The crane is then run along the track again until it is brought above a trough of zinc chloride, when the frame is lowered so that the outer face of the section will be immersed in the liquid. After this has been accomplished the section is ready to be dipped in the solder, which operation



Stage 7—Dipping the other side of the section into the solder

is shown in stage 6. The solder is carried in a molten condition in the flat pan seen just below the inverted frame. The illustration depicts one of the men in the act of manipulating the crane so as to bring the frame gently into the solder, which is kept in a liquid state by means of a gas flame beneath the trough.

A cooling slab stands close to the soldering trough, and may be seen in stage 6. The section is lifted from the solder and placed upon the slab, which, owing to the qualities of the metal, quickly robs the solder of its heat and allows it to harden in a very short space of time. When the solder has become hard the section is lifted from the frame and is ready to be soldered on the reverse side. This operation is shown in stage 7, where the wooden frame into which the section is clamped for this second dipping may be seen. As may be noticed, this operation is exactly the same as the first dipping, except that instead of using the crane to carry the heavy framework it is done by hand, as the section has been removed from the frame and is held together by the solder accumulated on the first dipping.

The next operation consists of brazing a 3/8-inch strip of brass around the outer edges of the top and bottom of the tubes and at the same time running the solder well around the ends of the tubes. The solder used in this operation is string solder, which has been made by dipping a ladle into the trough containing the molten solder and pouring the solder on the cooling block. The ladle is arranged so that when tilted the solder will flow from five small holes about ½ inch apart. As the solder is poured the ladle is moved along horizontally so that when cooling the solder will have the appearance of a string. As the strips of solder cool they are pushed off the cooling slab into a basket and are used in this form, known as string solder.

After the strips are fastened and the tubes soldered tightly together the section is then turned over to the assembly department. The first process to which it is submitted here is one of cleaning. A scraper and file are employed to remove all the excess tin which may have accumulated during the various processes through which the product has passed from the time it was a piece of raw material. The section is mounted upon a bench, as is shown in stage 8, and filed clean on all sides. It will often be found that a bubble of solder will have formed across the face of one of the squares in the section. This is also removed during this stage of the work, along with all the other excess material.

The frame of the radiator has been in course of construction at the same time as the tubular sections. The sheet brass of which it is composed has been bent and cut to form and the ends soldered. Each make of car usually has some variation in the shape of the radiator, so that separate frame shapes

Stage 10—Giving the final test for leaks in the finished radiator

are made for each car. The frame is then ready to be assembled with the section. This is accomplished by placing the section upon a horse, as seen in stage 9, and laying the frame over it. Any irregularities in shape are corrected and the frame is then finally slipped over the section and soldered carefully into place. The string solder is used in this operation and, as the strips are very thin, it is comparatively easy to reach all points.

The frame and the section together compose the radiator. The first step taken with the assembled radiator is to test it for leaks or defects. This is done by placing the radiator in a tank, as shown in stage 10. A supply of compressed air is available for this purpose, and this is led into the radiator. The outlet is corked up so that no air can escape and a pressure of 20 pounds is put on the radiator. If there are any leaks the air will escape in bubbles and indicate the position to the observer, who can then readily solder it at the required point. After the tests have been made and any leaks sealed the radiator is ready for the finishing touches, which consist for the most part of polishing and buffing processes.

The finishing polish is put on by hand and the radiators are then stacked up ready for handling by the delivery department. The handling of the radiator from start to finish is made as simple as possible by having the plant so arranged that one stage can follow another with as little interval between them as possible. There are no long pauses for parts to dry before the radiator can be touched, and there are no long distances through which parts have to be moved in the different stages of construction. They are all on the same floor and so arranged that the work starts from one end and gradually progresses through the shop until it is completed at the most convenient point for handling the finished product.

Stage 9—Fitting the radiator frame to the section before soldering them together

Stage 8—Scraping the excess tin accumulated during the manufacture from the section before assembling

Motor Wagons for Military Use

Consul General John L. Griffiths, London, England, is responsible for the statement that the British War Office has furnished particulars of a provisional scheme for the subsidizing of petrol motor lorries or wagons built after January 1, 1910, and owned by civilians. The vehicles will only be purchased in event of national emergency and will not be enrolled for hire purpose or for maneuvers. The War Department is to have the right to purchase on fixed terms any enrolled vehicle when the War Minister certifies in writing under his hand that the country is in a state of national danger or if a proclamation be issued under the reserve forces act of 1882.

The lorries which may be thus acquired are divided into two classes, (1) those capable of carrying a useful load of 3 tons (ton = 2,240 pounds) at 10 miles an hour, and (2) those capable of carrying a useful load of 30 hundredweight (hundredweight = 112 pounds) at 12 miles an hour. The wagons will be subsidized for two years, and the owners will receive an initial subsidy varying from $39 to $58 and an annual subsidy of $73, payable half-yearly. A further $48 will be paid if the wagons carry a second magneto.

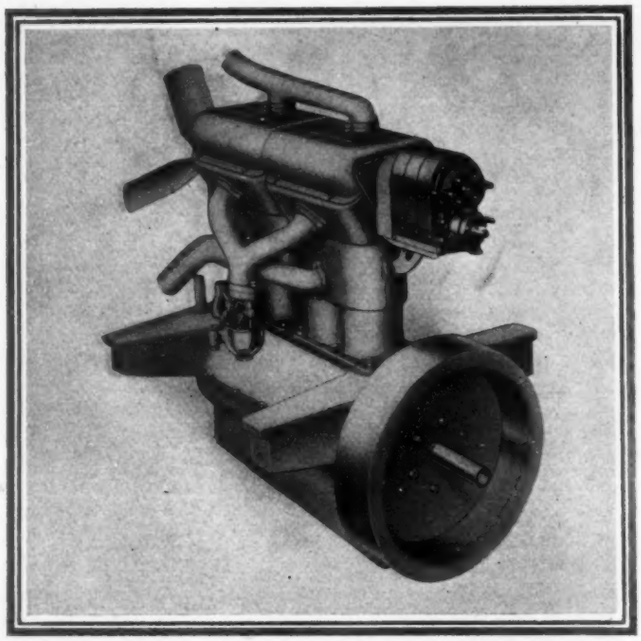


Fig. 1—External view of carbureter side of the R. C. Mitchell motor, showing simplicity of construction

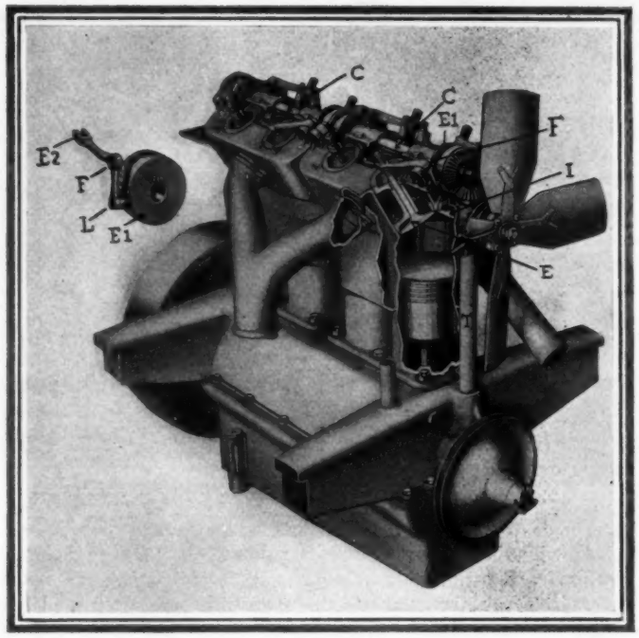


Fig. 2—Exhaust side of Mitchell motor, with part of casing removed to show the operation of the valves

Explaining the Mitchell Motor

AN inspection of the motor shown in Figs. 1 and 2 will reveal a number of new features contained in this construction of engine. The Mitchell motor is of the four-cylinder, four-cycle type, and is characterized by the small number of parts constituting it. Fig. 1, which is an external view of the carbureter side of the motor, shows that all the delicate parts of the engine have been given a high location, the valves for admission and exhaust being arranged in the heads of the cylinders and driven from above by a camshaft stationed above the cylinders. As is seen in Fig. 1, the magneto has also been given a high-up location, with the obvious advantage of it being free from troubles that arise in fording a stream. The importance of this feature was fully recognized by the participants of the recent Glidden tour.

The cylinders are of gray iron and cast in pairs, with ample water jackets surrounding those portions which require cooling. The water piping has been made of liberal dimensions, and the cooling water, which is circulated by a centrifugal pump in the crankcase, enters the jacket on the inlet side, leaving it, after having played around the cylinders, through the pipes seen on the top of the jacket. The valves are in cages in the cylinder heads, and referring to Fig. 2 it is seen that the mushrooms, E of the inlet and I of the exhaust, as they seat form an obtuse angle. The valves are of large diameter so as to permit of rapid charging and scavenging, and are actuated from the overhead camshaft C through barred cams E1. The end of the link L of the valve stem lever slides in the cam slot, and the enlarged view of the cam in Fig. 2 illustrates the construction of this member. The lever is fulcrumed at F, so that the eccentric action of E1 during the rotation of the camshaft causes the end E2 of the valve lever to be reciprocated, thereby lifting and dropping the mushroom off and to its seat. The location and construction of the cams does away with the necessity of using heavy springs with a consequent loss of power. The cams close the valves as positively as they open them at all motor speeds.

The camshaft itself is driven at half engine speed from the crankshaft by means of transmission rod T engaging crank and camshafts by means of bevel gears at both its ends; camshaft is equipped with wick oiling and reservoir containing enough lubricant to keep the shaft well oiled for a month. Each barrel cam operates one inlet and one exhaust valve, so that only four cams are required to operate the eight valves. The magneto is driven by a spur gear direct from the camshaft and at the same speed as this shaft. The location of the magneto keeps it beyond the range of dirt and grease, and the design of the motor is such that the magneto extends through the dash, being directly accessible for the driver if inspection is wanted.

As may be seen from Fig. 1, the carbureter and intake manifold are located at the left side of the motor, and the exhaust appliances are stationed on the other side of the engine. Beside the fact that this arrangement keeps the sides of the engine free of all accessories, save a sight-feed on the crankcase on the exhaust side, the peculiar arrangement of the magneto is accompanied by a saving in power required to drive it. The direct drive of the magneto off the camshaft does away with the friction loss otherwise encountered in the magneto half-time gear.

All working parts of the motors are fully encased, but the jacket is so bolted to the base chamber that eventual inspection may be had without difficulty. In the crankcase is located an oil pump, which lifts the oil from the base chamber, serving as a reservoir, to the cylinder bearings and connecting rods through small brass leads, affording a positive force-feed system.

The flywheel is of substantial dimension, with sufficient room in it to take in a clutch of the cone or disc type. It is located adjacent to the rear end of the crankcase casting, which has two pressed-steel drop arms on each side, permitting of suspending the motor on a chassis frame.

The initial motor constructed by the designer has 4 3-16 inches bore and a stroke of 5 inches. It is used on a seven-passenger touring car, and for nine months has given very satisfactory service. The inventor and designer of the motor is R. C. Mitchell, of Springfield, Ohio.

The Long-Stroke Motor for Cars

Part I.

By Professor W. D. Ennis.

Should Wear Longer Than the Short-Stroke Type and Prove a Better Hill-Climber—It Requires a Re-designing of the Motor and Generally Raises the Center of Gravity of the Car—Little Extra Weight Need Be Added—The Cooling Problem Is Not Disturbed—A Plea to Standardize the Revolutions per Minute of the Crankshaft, Rather Than the Piston Speed in Estimating the Horsepower of the Motor—Many Practical Considerations.

THE practice of rating motors at standardized piston speeds may be justly criticised. All common rating formulas assume some fixed speed of piston. Thus the expression,

$$HP = \frac{nd^2}{4}$$

for the horsepower output of n four-cycle cylinders having each a diameter of d inches holds approximately, only for a piston speed of 1000 feet per minute. By this rule an ordinary automobile motor with four cylinders of 4-inch diameter would give 16 horsepower, no matter what its stroke. The length of stroke is immaterial because with a fixed piston speed the longer the stroke the fewer the number of revolutions per minute. For example, with a 6-inch stroke we should run at 1000 revolutions per minute, and with a 4-inch stroke at 1500. In each case the piston speed is 1000 feet per minute.

Short stroke means high rotative or crankshaft speed for a given piston speed. Assume the useful mileage of a certain car to be 100,000 miles, during which the travel of a point on one of its 34-inch tires will be

$$12 \text{ inches} \times 100{,}000 \times 5280 = 6{,}336{,}000{,}000 \text{ inches}$$

Since the circumference of the tire is $34 \times 3.1416 = 106.5$ inches, the wheel will have made $6{,}336{,}000{,}000 \div 106.5 = 59{,}400{,}000$ revolutions during the life of the car. If the average gear ratio between motor and rear wheels during this whole period has been 4, the motor will have made $4 \times 59{,}400{,}000 = 237{,}600{,}000$ revolutions. If its stroke is 5 inches, its pistons will each have traveled

$$2 \times 5 \times 237{,}600{,}000 \times \frac{1}{12} = 198{,}000{,}000 \text{ feet}$$

or 37,550 miles. The same total piston travel would have been realized by a motor of 6-inch stroke while making 198,000,000 revolutions. For a given piston speed, or piston travel, the revolutions per minute of the motor will vary inversely as its stroke.

Standardized Revolutions Per Minute

It is the number of revolutions per minute that should be standardized, rather than the piston speed. Shocks wear out machinery. Every time a crankshaft makes a revolution, the piston reverses its direction of movement twice. In each cylinder of the 5-inch stroke motor just referred to, there will have been 475,200,000 such reversals and shocks. By changing the stroke to 6 inches, the mileage and horsepower might be the same, while the number of shocks would be reduced 20 per cent., the piston speed remaining constant. Roughly speaking, then, the 6-inch motor should be in better condition than the 5-inch, after 100,000 miles of service. When piston speeds were standardized, it was because stroke lengths were not greatly variable. With new length of stroke, new piston speeds are permissible, and the standard of piston speed will be directly related to the length of stroke.

The long stroke increases the horsepower capacity of the motor. Motor output is roughly proportional to piston speed. With a fixed number of revolutions per minute, the longer the stroke the higher the piston speed and the greater the power output.

Long-stroke motors have greater pulling power. This may be proved in two ways. First: Horsepower output is determined by pulling power for "tractive force" and speed, jointly. Consider two cars, moving at the same speed, up two parallel hills of different grades. One has a 5-inch motor, the other a 6-inch motor. Otherwise the cars are alike. The piston speeds being the same, the 6-inch motor will develop the greater horsepower by 20 per cent. This horsepower is exerted in propelling the car up the hill. The propelling or tractive force must be, then, 20 per cent. greater in the case of the 6-inch motor.

As a second proof, consider Fig. 1, which represents successive simplifications of the driving mechanism. In Part A the piston B moves in the cylinder A, its rod C being pinned to the gear E at D. This gear drives the larger gear F about the shaft G. The force exerted at the pin D by the rod turns the wheel G at rotative speed somewhat less than that of E. In Part B such force is represented by the arrow L, the wheel teeth are omitted, and the revolution of J on a roadway is assumed to be equivalent to the development of the traction or pulley force K. In Part C both wheels are shown on the same shaft. The ratio of their diameters must now be reversed in order that the peripheral or circumferential speed of the second wheel may be the same as in the first sketch. In Part D the wheels are replaced by the equivalent wheel spokes or levers Q and R. The length of Q is equal to half the diameter of the circle described by the pin D in Part A. The length of R is half the diameter of the large wheel F, and is independent of the stroke of the motor. This stroke is, however, equal to twice the length Q.

Then if a given force be developed by the explosion in the cylinder, regardless of length of stroke, we have, in Part D, P and R fixed, Q proportional to the motor stroke, and S depending on all three. By the principle of levers,

$$P \times Q = R \times S. \text{ Then } S = \frac{PQ}{R}$$

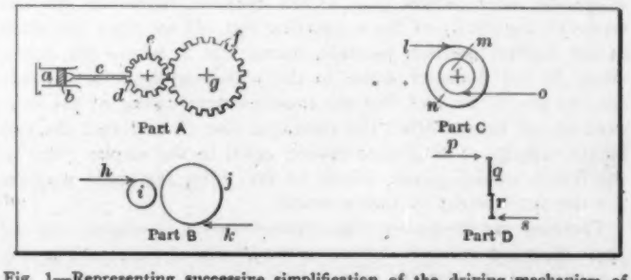


Fig. 1—Representing successive simplification of the driving mechanism of an automobile

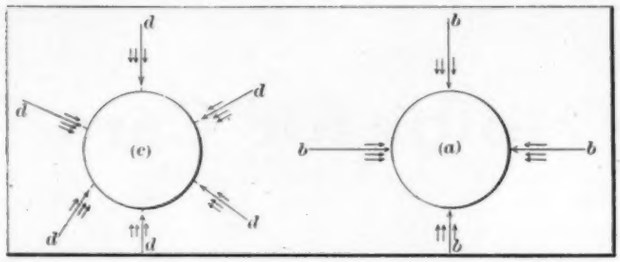


Fig. 2—Illustrating the comparative stresses in six-cylinder and four-cylinder motors

and is directly proportional to the stroke. And *S* is the tractive or pulling force exerted in propelling the car.

Increasing the number of cylinders does away with some of the advantages of the long-stroke motor. The total wear of the mechanism is dependent not only on the number of shocks but also on their intensity. At the moment when the piston is being reversed, at the head end of its power stroke, it undergoes the stress due to the pressure obtained in combustion. This pressure in pounds per square inch is independent of the length of the stroke. The total stress produced depends on the pressure and on the area of the piston. With six cylinders of the same aggregate piston area as four cylinders, the stresses in any one cylinder are only two-thirds as great as those in the four-cylinder motor. The condition of things is as suggested in Fig. 2. In the case of four cylinders, during two revolutions, each cylinder is fired once, giving the four severe stresses indicated by the arrows *B, B, B, B,* and reverses three times, giving the lighter stresses indicated by the short arrows. With six cylinders, there are six severe stresses and eighteen reversals, in two revolutions, but the former (indicated by the arrows *D, D, D, D, D, D*) are less severe than those with four cylinders of the same capacity. The possible number of revolutions during the life of the car will therefore be increased because the shocks of reversal are decreased in intensity: and in this respect the use of six cylinders serves the same purpose as the use of a long stroke.

Long-Stroke Motors Influence Design

The general use of long-stroke motors may seriously influence design standards. Fig. 3 shows that the over-all height of the motor includes the stroke, piston thickness and the clearance, which is proportional to the stroke, and the length of the connecting rod, also proportional to the stroke. If the connecting rod is twice the length of stroke, and the clearance height is half the stroke, then the head room necessary must exceed 3 1-2 times the length of the stroke, and a change of 2 inches in the latter will require 7 inches more head room. Obviously the overhead type of valve would with a motor of long stroke be undesirable. Again, the effect of increasing the stroke length may be to further increase the length of the connecting rod. Thus in Fig. 4, which is drawn to scale, we have a 4-inch piston, *A B*, with a stroke of 4 inches, *B C*, and 37 1-2 per cent. clearance, *C D*. Assume the connecting rod pin to be at *E* when the piston is down, and at *F* when the piston is up. If the clearance width of the rod is 1 inch, then the line *G*, drawn from *F* to just strike the inner bottom edge of the cylinder, represents the extreme of angularity of the connecting rod. If we place the shaft at the highest position possible, namely, at *J*, where the crank circle *H* (of diameter equal to the piston stroke) just strikes the rod pin *E*, we find that the most extreme swing of the connecting rod keeps within the clearance line *G*, and that the rod length may be as little as 4 inches, equal to the stroke. But in the 6-inch stroke motor, shown to the right, the same position for the shaft might be impracticable.

The long stroke means a new distribution of weights. If the shaft elevation is fixed, increasing the length of the stroke means a raising of the heavier parts of the usual type of motor, and unless some equivalent adjustment is made elsewhere in the opposite direction, the center of gravity of the whole car will be elevated. A higher center of gravity should not be contemplated if cars are to be safe under usual curve and speed conditions. In Fig. 5, if *B* is the center of gravity, and if *A B* represent the centrifugal force due to rounding the curve, which depends on the radius of the curve and the speed, and *B C* the weight of the car; then the line *B D* joining *B* with the intersection *D* of lines parallel to *A B* and *B C*, as shown, represents the resultant force acting on the car through its center of gravity. If this line *B D* passes outside the base of the car, the latter will overturn. As shown, the line in question strikes the ground at *E*, while the wheel rests on the ground at *F*, so that the machine is safe. But if the center of gravity were raised to *G*, then with the same weight and centrifugal force the direction of the resultant line *G I* shows that the car would be unstable. Power plant and body design may thus be seriously influenced by the adoption of the long stroke.

The details of cylinder design may be modified. At standardized piston speed both the amount of mixture supplied and the time available to supply it will depend upon the stroke, and the necessary valve areas will be unaltered. But if *rotative* speeds be standardized and piston speeds be made proportional to strokes, then the long-stroke motor will demand a more rapid supply of gas and all ports will be made larger. Since there are objections to increasing valve travel, either increased valve areas or multiplied valves will be necessary.

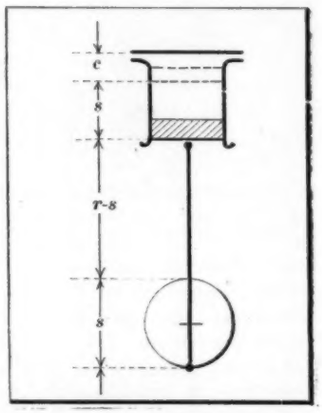


Fig. 3—Showing factors that must be considered in designing long-stroke motors

Cooling arrangements need not be greatly changed. The lengthening of the stroke gives a proportionate increase in power output. The amount of heat to be removed by water circulation will increase in about the same ratio as the power, and will therefore be directly proportional to the stroke. As the cylinder barrel length available for jacketing varies with the stroke, there is about the same amount of transmitting surface, considering the amount of heat to be carried off, in both types of cylinder. If the short stroke permits of overhead valves, however, the arrangement and effectiveness of jacketing may differ in the two motors.

The long-stroke cylinder affords, in proportion to its power capacity, more room for accessories on the side walls of the clearance space, and less room on the top, than the older type of motor. These available space conditions may easily lead to new standards in valve type, valve location and jacketing.

The reduction in friction and greater ease of lubrication sometimes claimed cannot yet be demonstrated. Following steam engine analogies, it is safe to say that in both of these important respects a slow running engine of long stroke surpasses one of short stroke and high speed. But in automobile practice, long strokes are apt to be associated with high speeds, the greater power output for a given size and weight being the main object in view: and if no greater expense in lost work by friction or cost of lubrication ensues, we shall still have ample ground for approving the novelty.

A similar consideration applies to the question of weights. A long-stroke motor weighs more because it is longer. But it gives more power. At equal rotative speeds, the long-stroke motor should weigh less, in proportion to its power output, than the one of short stroke. If comparisons of actual design, weights and rating fail to confirm this, it is because the long-stroke cylinders have not yet been rated at full piston speed. A speed of 1500 feet per minute is just as reasonable at 9-inch stroke as one of 1,000 feet per minute is at 6-inch stroke.

Relative weights of reciprocating parts are in favor of long strokes. The total pressures at reversal, represented by the arrows of Fig. 2, are less with long strokes, because piston diameters and areas are less for the same power. These total pressures determine dimensions of piston, rod, crank pin, crank and shaft.

Summary of the Results

Two schools of design are possible: With one present piston speeds may be regarded as the limit. Then the long-stroke motor will decrease the revolutions per minute, produce smoothness of running and lead to fewer breakdowns and longer life of plant. The power capacity will not be much increased, but the pulling force will be, and the cars will be able to negotiate steeper hills, though at low speeds. Valve areas will not necessarily increase. The motor weight will probably constitute an increased proportion of the whole weight of machine. Should the six-cylinder car prove especially more durable and smooth running than the four, then the long-stroke motor is not likely to monopolize the field with those who adhere to present piston speeds.

The other school of design standardizes rotative speeds. Long strokes then increase piston speeds and power output, while leading to about the same smoothness of running and length of life as in older designs. The pulling force will be no greater than that at lower piston speeds, but will be greater than in short stroke motors, regardless of piston speed. Large valve ports and passages will be necessary.

In either development, the long stroke properly applied necessitates re-designing throughout, particularly in order that the necessary head room may be obtained while keeping the center of gravity low. Valves will be kept at the sides of the cylinders rather than placed on top, and the type of valve used may be a modification from any now existing. Corresponding modifications in cooling arrangements will be necessary.

Reducing Time in Fire Fighting

For years the officials in charge of the fire departments of the large cities have been struggling with the problem of saving seconds. Everything possible toward that end has been done, the cost being given but little, if any, consideration. The wisdom of this course is apparent, the smallest fraction of time saved in the early stages of a fire being sufficient often to give the firemen that advantage which will prevent a small fire developing into a conflagration. Under the circumstances it is not to be wondered at that fire department officials of every city of considerable size are studying the possibilities of motor-driven apparatus, for in the single item of time saved the advantage of this latter-day method over the old horse-drawn proposition is almost beyond calculation. It is an actual fact, based upon figures gathered by officials of those cities which are fortunate enough to possess motor fire apparatus, that the time necessary to get to work at a fire has been reduced by more than one-half. This remarkable showing has attracted the attention of fire-fighters generally and is responsible in large measure for the demand from all sides for the early substitution of motor-driven apparatus for the antiquated horse-drawn machines, in the belief that the initial cost of installation of the former would be but a bagatelle when compared with the reduction of the annual fire losses following upon such a change.

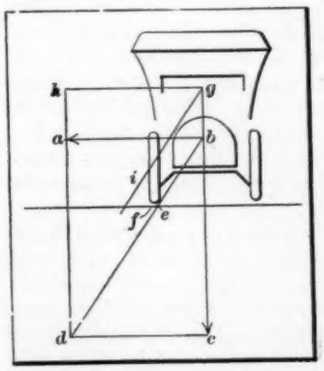


Fig. 5—Showing how length of the stroke raises the center of gravity of a car

Statistics of Italian Production

The value of the automobiles and automobile accessories exported from Turin, Italy, to the United States during 1910 was $295,013, as against $674,666 in 1909. Probably the year 1910 will hereafter appear as having marked a turn of the tide, and that European automobiles will in the future, on account of the formidable and increasing competition that they have met and must continue to meet from American automobile manufacturers, be exported to the United States in steadily decreasing numbers. The decrease can be explained in no other satisfactory way. It occurred in a year when the production of automobiles in the district of Turin and in Italy in general proved greater than ever before; when conditions in the district and throughout Italy were especially favorable to automobile builders; and when, for the first time, American automobiles and accessories entered Italian markets under markedly favorable conditions. The fact that the most important automobile-building company in Turin and Italy, and one of the most important in Europe, opened large works in the United States during the year had nothing to do with the decrease.

An estimate covering automobiles built in Turin during 1910 sets the number at 3,907, as against the estimate of 3,700 for 1909, and it is estimated that during 1910 only 560 automobiles were built in Italy outside of Piedmont.

Market conditions, on the whole, were good, and the demand for Turin automobiles, especially for cars of medium power, was satisfactory and uniform.

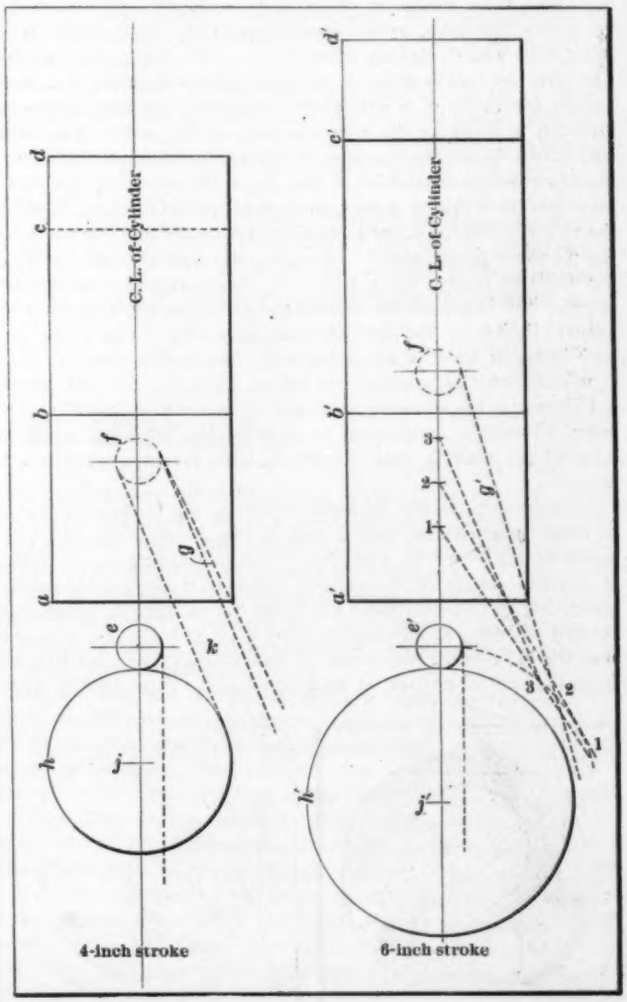


Fig. 4—Showing the clearance of connecting rods necessary in cylinders of different lengths

Digest of the Leading Foreign Papers

FEATURES OF RUTHARDT MAGNETO—The Ruthardt magneto represents a comparatively recent German reconstruction and rearrangement of the mechanical elements of the high-tension magneto, resulting in a considerable weight reduction, which is of special interest to aviators, but involving at the same time the introduction of features which are considered as technical improvements relating to efficiency and reliability. The magnet is composed of a certain number of magnetic discs of the shape shown in Fig. 1. The armature turns directly between the poles, so that pole pieces are avoided as well as the screws needed for fastening them. The poles are polished so as to further reduce the space between them and the armature, and the magnetic field is thus utilized to the full. The armature is of the Siemens T type with two bobbins, one primary and one secondary, completely insulated from one another. The interrupter, Fig. 2, has no bearings and consequently requires no oil; wearing parts are avoided in it. The receiver consists of an insulated block D secured to the rotating disc of the breaker box by a screw I. A bent leaf spring A, provided with a platinum contact B, is secured to a boss K forming part of the mass. Screw C with a platinum point is adjustable in block D, and one of the edges, L, of the latter serves as a runway for the fiber roller E, which can turn, with considerable play, around the small spindle F, while retained laterally by a flat spring, not shown. The free end of spring A is bent back somewhat and rests against the roller with a tendency to press it outward, in which thrust it is aided by the centrifugality of the parts. The roller which travels on the interior cylindrical surface of rim N will therefore admit contact of B and C—short-circuiting the armature—except while it passes over the cam G on rim N, when the roller is pushed inward and forces the spring A outward and the platinum points apart. Two cams are provided on rim N if the magneto is used for a two, four or six-cylinder engine. The breaker box is adjustable around the armature shaft, so that the normal timing of the ignition may be varied. The screw bolt with hexagon head M which holds the box to the armature shaft conducts also the primary current to block D. A leaf spring, not shown in the drawing, impinges upon the head of M and its other extremity terminates in a threaded wire to which is screwed the binding post connecting with the interrupter mechanism.

An accessory of the Ruthardt magneto which may be applied to other magnetos as well is the device adopted for the automatic advancement of the spark, with increasing motor speed. It consists simply in a coupling collar formed of two metallic plates, Fig. 3, in which there are formed a number of depressions serving as beds for an equal number of steel balls and so curved that the balls under the effect of centrifugality will tend to roll from the central portion of each depression to the portion which is nearer the periphery and more advanced in the direction of rotation. As the balls constitute the means by which rotation is transmitted from the driving plate to the driven plate in this coupling, it is understood that the driven plate is advanced in its relation to the driving plate when the balls take this more peripheral, and more advanced, position, and, as the driven plate is coupled to the armature shaft and the driving plate to the motor, it is seen that the object of advancing the spark by a device which forms no part of the magneto itself is accomplished. The description does not state by what means the two plates of the coupling are held in such a relation that the balls in seeking more peripheral positions are forced to overcome a small resistance, unvarying in amount.

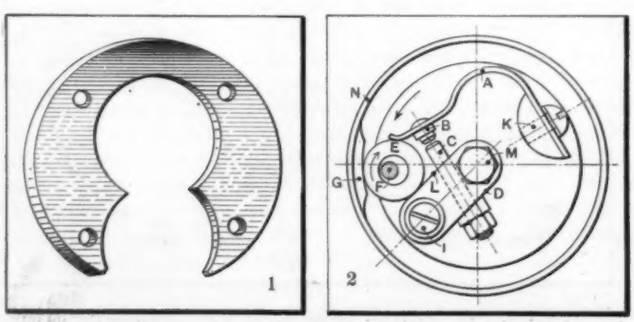


Fig. 1—One of the magnet disks of Ruthardt magneto—Fig. 2—Ruthardt interrupter mechanism

The weight of the Ruthardt magneto is given as about 12 pounds for a 25-horsepower, 4-cylinder motor, reducible to 2 1-2 pounds in the type intended for a 4-horsepower motor bicycle. From description by F. Carles in *La Vie Automobile*, August 5.

GERMAN CONSTRUCTION—From observations of a general character on the trend of innovations in German automobiles, as these were shown at the recent international automobile exhibition in Berlin, it appears that great simplicity in lines and colors marks practically all automobiles intended for private use, but that, on the other hand, the public cabs exhibit schemes of decoration by which the builders have apparently aimed to meet the supposed vulgarian taste of the masses. Many of them look like movable feasts. Festoons of roses and violets or vines heavy with enormous bunches of full-ripe grapes wind themselves in painted counterfeit around the carriage work, and even encircle the driver's seat, and gold and silver plating in profusion seems to belie the statement that power cabs can be made to pay only by the strictest economy. The use of art etching on the window panes seems particularly superfluous in view of the fact that, whenever a window is broken by a "fare," there is invariably a quarrel about the amount of the damage to be paid.

Technically, it is noticed that in nearly all of the German automobiles at the exhibition the designers have gone to great lengths to reduce all noises to a minimum. Especially the valve movements have been the object of attention, and this is ascribed largely to the influence of the valveless motors and their success. In one of the Adler motors a cylindrical heel on the mushroom valve admits the use of cams which rise almost imperceptibly from their base circle, while in other cases the noise is not really removed but only muffled and localized by encasing the valve springs.

The oil ducts and force-feed oilers are now uniformly enclosed within the crankshaft casing, and the ducts to the individual bearings are frequently worked out as canalizations in the motor castings. As the perfecting of the oil feed has a considerable influence on the exhaust and on the formation of carbon deposits in the combustion chambers and in the grooves of the piston rings, many attempts have been made to so regulate the oil feed that surplus oil will escape combustion in the greatest possible degree, particularly under those trying circumstances when cars are forced to many stops or half-stops in close traffic and are likely to omit noxious odors in the exhaust.

Radiators are uniformly smaller than formerly, but much has been done to increase the air-cooling of the water-cooling system. Motors entirely cooled by air have, on the other hand, completely disappeared, even in the smallest cars.

The carbureters show a revolution. The noiseless double-jet type with auxiliary air inlet holds the field.

The magnetos, while reduced in size, develop strong sparks

even at low rotary velocity of the shaft, so that starting of the vehicles has become much facilitated.

The valveless motor is represented not only by the Daimler companies of Stuttgart and Unterturckheim, but also by Loeb & Company, of Charlottenburg, and Stoewer Brothers, of Stettin.—From *Automobil-Betrieb,* October 1 and 15.

THE WIRE MESH WINDSHIELD—Trials have been made lately on the Brooklands track in England of windshields in which the customary glass surface is replaced by wire screening. Lightness, durability, low cost and safety in case of accident are not the only virtues claimed. They are supposed to afford better protection, on the following theory: The solid glass front constitutes an impenetrable barrier to the wind, and there is therefore formed a low-pressure atmospheric center behind it, causing the air to rush in from the sides in a disagreeably turbulent fashion. The wire screening, on the contrary, lets the air through while yet tempering its force, so that it does not strike the faces of the automobilists unpleasantly. When it rains the water sticks to the glass and bars the outlook, while it is driven through the wire web or runs down, finding but slight basis for adhesion in the thin strands.

Further information brings out, however, that wire screening was tried long ago for this purpose by Mr. Ferra, director of the astronomical observatory of French Indo-China. He found it good enough against wind and dust, but impracticable in a driving rain. The water stayed in the meshes and it was difficult to see through. Mr. Ferra's screening was quite close, the additional informant concedes, leaving openings which were only 1-2 millimeter square, and the possibility remains that the English improvement involves somewhat larger meshes and perhaps the use of a metal, for the wires, to which the water has a minimum of adhesion.—From *Automobil-Betrieb,* October 1 and 15.

RULES FOR THE PRESERVATION OF METALLIC MACHINE PARTS against rust were discussed and formulated with much detail at the last congress at Zurich by the International Association for the Testing of Materials. An elaborate report of the subject was prepared. The principal qualities which coatings for metallic pieces should possess are the following:

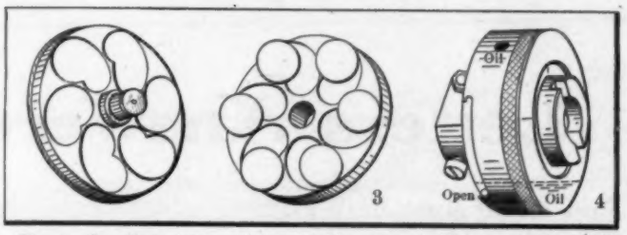


Fig. 3—Coupling plates with steel balls. Fig. 4—The complete coupling between armature shaft and motor, allowing automatic advancement of ignition by magneto

The coat should be thick; to this end the paint must contain as little as possible of volatile substances, excluding by this rule those having a turpentine base and colors derived from coal tar.

The coat must be at once elastic and hard, so as to resist well in the case of expansions and contractions and also against shocks and vibrations. These two conditions lead to products of a linseed oil base, which when dried form a soft elastic skin which in itself hardens very slowly but can be hardened by the admixture of metallic oxides.

The coat finally must be and remain continuous without shrinkage and cracking, which means that the paint must not be subject to decomposition.

The conclusions of the committee in charge of the subject are very precise. The colors to be used should be formed from sesquioxides of iron emulated in boiled linseed oil. The boiling of the oil should include a certain quantity of litharge or peroxide of manganese, giving a product of a minimum density of 0.93.

White or red lead or even graphite, if reduced to an impalpable powder, may be substituted for the iron oxide. These powders however must be in a state of purity and absolutely free from sulphur.—From *Lè Génie Rural,* No. 37 (Sept.).

A VIGOROUS IGNITION always has a tendency to reduce the fuel consumption and to facilitate starting of the motor; therefore, it is often difficult to distinguish between an error relating to the adjustment of the carbureter and one relating to weakness or faulty timing of the spark.

Harking Back a Decade

ITEMS appearing in the issue of *The Motor Review* under date of November 7, 1901:

The second annual automobile show being held this week at Madison Square Garden is easily the largest and most important event of its kind ever held in this country. Among the exhibitors are thirty-nine American manufacturing concerns, showing fifty-five gasoline cars; fifty-eight steamers and twenty-four electrics. Twenty different varieties of gasoline cars are on exhibition. Opening night drew an immense crowd of well-dressed automobile enthusiasts.

Great progress is to be noted in the development of the gasoline cars. The motors are still unstandardized and both single and double cylinders have their advocates while the question of upright or horizontal position for the cylinders is still a live issue. Tonneaus are to be seen on all kinds of cars and front end motor bonnets are quite common. Surface carbureters have lost favor. The magneto generator is coming into more general use. Transmission gears now have three forward speeds. A majority of the models shown are chain-driven but bevel gear drives are gradually creeping into use. Running gears are generally heavier.

The Winton Motor Carriage Company has announced an increase of its capitalization from $200,000 to $1,000,000, to be used in extending its manufacturing facilities.

Apperson Brothers have withdrawn from the Haynes-Apperson Company and have formed a new company to manufacture cars at Kokomo, Ind. The parent company made twelve cars in 1898 and since has largely increased its production.

The H. H. Franklin Manufacturing Company, of Syracuse, N. Y., will increase its capitalization from $100,000 to $250,000 and will manufacture a gasoline automobile which is said to contain several unusual features.

Exports of automobiles and automobile parts in September amounted to $78,100, an increase in excess of $22,000 over the figures for August. England took merchandise of this character valued at $56,000.

Opinions are likely to differ as to the value of races and other exceptional public performances in advancing the motor vehicle in popular favor, but the attainment of high speed by some exceptional carriage is at best a doubtful benefit to the cause, especially when compared with some small improvement that tends to increase the utility or endurance of the vehicle.—*Editorial.*

R. M. Owen and four of his associates have incorporated the Western Automobile Company of Cleveland.

Emancipation Day will be celebrated in England next week to mark the fifth anniversary of the passage of a law allowing a speed of 12 miles an hour for automobiles.

Letters Answered and Discussed

Flow of Oil Must Be Watched

EDITOR THE AUTOMOBILE:

[2,900]—Please give advice on following subject. In filling crankcase of my automobile, which has splash system of oiling, I always spill some lubricant over outside of casting and often also my clothes. How can I get away from this abuse? JOHN F. MURRAY.

Corsicana Junction, Tex.

A simple way of avoiding a dirty job is shown in Fig. 1. The upper half of the basechamber is shown, which has been tapped and a flanged filler attached to it. Flange and casting surface must be kept in tight relation by means of a gasket. At a somewhat lower point than the filler, the casting is tapped for a 1-inch pipe and an elbow is screwed into the opening, with the other arm standing erect. Into this arm is fitted a sight-feed, as shown in the illustration. If filler and sight-feed are well fitted, they communicate through the crankcase, and the level of the oil in the basechamber will be able to be read clearly on the sight-feed.

The Editor invites subscribers to communicate their automobile troubles and personal experiences, stating them clearly on one side of the paper. If the nature of the case permits, send a sketch, even if it be rough, in order to assist to a clearer understanding. Each communication will receive attention in the order of its receipt, if the writer's signature and address accompany it as an evidence of good faith. If the writer objects to the publication of his name, he may add a nom de plume.

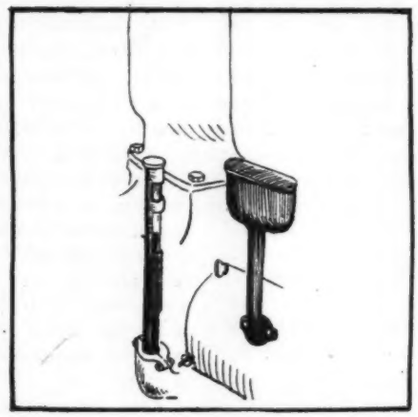


Fig. 1—Method of attaching a sight-feed and filler to the base chamber of a motor

Acetylene Must Be Clean

Editor THE AUTOMOBILE:

[2,901]—My acetylene lighting system, which has always been in good working order, has failed to give satisfaction of late. My generator consumes much more carbide than it used to, and instead of improving the light derived from this source I find that the good qualities of the acetylene are being lost. The headlights burn with a comparatively dim flame and the glass of the lens rapidly covers up with water drops. Can you suggest remedy?

INTERESTED.

Darien, Ga.

Impurities are the cause of your trouble. To radically cure the ill, it will first be necessary to clean the generator of the residues left in there of the old carbide charges. It's a ten-to-one shot that you have plenty of ashes in the generator, but this is a very poor state of things. Cleaning the generator will do away with most of the impurities, but those which spring from inferior carbide must still be considered. Acetylene produced from poor carbide frequently carries foreign matter with it, as well as vapor, which of course deprives the flame of its fine lighting quality. These two troubles may be obviated by interposing a trap in the gas line near the generator. As Fig. 3 shows, the pipes leading to the headlights pass through a vessel containing a trapping chamber, in which the vapor or water drops traveling with the acetylene are precipitated. The draincock attached to the trap permits of emptying it when this becomes necessary. Another way of cleaning the acetylene on its way to the lights is to pass it through a vessel filled with moist sawdust or coke. A very clean gas will be obtained by this method of purifying it.

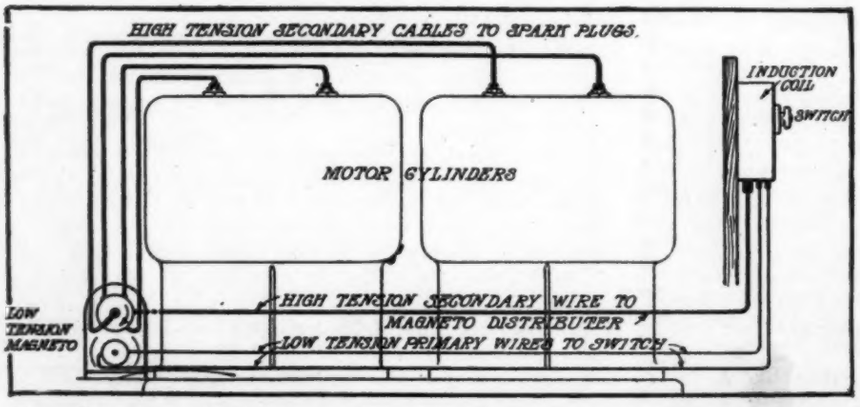

HIGH TENSION SECONDARY CABLES TO SPARK PLUGS.
INDUCTION COIL
SWITCH
MOTOR CYLINDERS
HIGH TENSION SECONDARY WIRE TO MAGNETO DISTRIBUTER
LOW TENSION PRIMARY WIRES TO SWITCH
LOW TENSION MAGNETO

Fig. 2—Wiring system for ignition on a four-cylinder motor, using a low-tension magneto and an auxiliary coil

Wants Jump Spark Ignition

Editor THE AUTOMOBILE:

[2,902]—Please give me some information as to the installation of a jump spark ignition system using a low-tension magneto and an auxiliary coil on the dash. I have had considerable trouble with the system which I am now using and am thinking of changing. Any help which you can give me will be appreciated. C. J. D.

New York City.

The system of ignition which you mention is comparatively easy to install. Fig. 2 shows the method of wiring your car for it. The high tension secondary wires go to the spark plugs and one wire goes to the magneto distributor on the dash as shown. The primary wires are run directly to the switch. Care should be taken to make good contacts and to trace all connections after being made. If you are not familiar with this line of work, we would suggest that you have the job done by an experienced repair man.

Valve Spring Casings

Editor THE AUTOMOBILE:

[2,903]—Will you kindly illustrate in your columns some method of enclosing valve springs so as to keep out dirt?

Allentown, Pa. M. E. F.

One method of putting casings over valve springs is shown roughly by Fig. 4. However, this would apply only to valves which are in the cylinder heads. With the ordinary valve arrangement, casings, when used, are merely sleeves which are slipped over the valve springs and which rest on the spring seats. The casings here shown are bolted to the jacket heads and make a very tight and rigid construction. The use of these casings is becoming more and more general each year.

Mechanical Oiler Adjustment

Editor THE AUTOMOBILE:

[2,904]—Will you kindly give me the following information? I have a splash system of lubrication installed on my automobile, but from what I hear I believe that force-feed systems are positively superior to that

means of oiling. Therefore I would like to install a mechanical oiler on my car, especially since I understand that it is possible to regulate the amount of lubricant afforded to the various parts by this system. Will you explain in which way the flow of oil is lubricated? CONSTANT READER.

Bayonne, N. J.

There is usually some means of adjusting the length of the stroke of each plunger which forces oil out to its own particular part to be oiled, or of allowing a portion of the oil to flow back into the oil reservoir of the lubricator. Some have a sight-feed, other visible outlets to be used only temporarily during adjustment and wasting of the oil, so that they can be set for the required amount of oil for each movement of the pump plunger or other device for forcing the oil out. Start the engine and adjust for the required amount of oil. The feed device for each pipe should continue delivering the same amount of oil per stroke of its plunger or other device, whether the oil is thick or thin, hot or cold.

Carbureter Pops Once More

Editor THE AUTOMOBILE:

[2,905]—I have observed that when I speed up my engine the carbureter infallibly begins to pop. Why is this? Also, how can this nuisance be done away with? S. M. G.

Newark, N. J.

Popping in the carbureter, i. e., backfiring through the inlet pipe, may be due to a number of causes. A lean mixture may be the reason; in which case the engine should be given more gasoline, unless there is a leak in the inlet pipe or manifold, through which air is drawn and added to the mixture. An overheated cylinder or carbon deposits in the combustion chamber may cause preignition, permitting the flame to travel through open admission valve toward the carbureter. It may also be the fault of a weak inlet valve spring not strong enough to close the valve in time before the spark occurs in the cylinder; finally, a bent of dirty valve stem may be the cause of the evil. Remedies for all the troubles named are obvious.

Misfiring Due to Several Causes

Editor THE AUTOMOBILE:

[2,906]—The cylinders on my car misfired not infrequently during the last week or so, and in order to locate the trouble I have looked over the spark plugs, but they seem to be in good shape. I am sure something is wrong, but I understand very little of the jump-spark system that is used on my car. The system includes a battery and trembler spark coil for each cylinder. Will you explain the situation to a SUBSCRIBER.

Louisville, Ky.

Tests in the following order can be made until the trouble is found:

Switch on the reserve battery while still running.

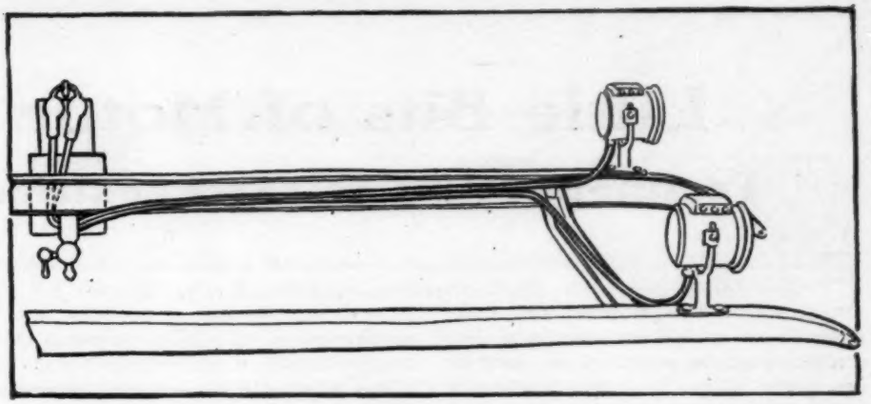


Fig. 3—How a trap may be interposed in the acetylene gas lead in order to catch water and mechanical impurities

Hold down the tremblers on the induction coils one at a time, or in pairs, to determine which cylinder misfires.

Stop the engine and crank slowly, noting whether each trembler vibrates strongly. If all vibrate weakly look for loose connections in the battery, the ground wires and the wire connecting the battery to the induction coil. Also examine for a broken wire inside the insulation of the same wires. Look for bare places on the wire between the battery and coils. See that the covering of the battery cells is not wet or worn off so that the zincs touch each other. Put in new low-tension wires.

If only one vibrator has weak action, clean the contact points, readjust its tension and examine the wire and connections between it and the timer. Examine the timer, noting whether the contacts and spring for the weak trembler are in order.

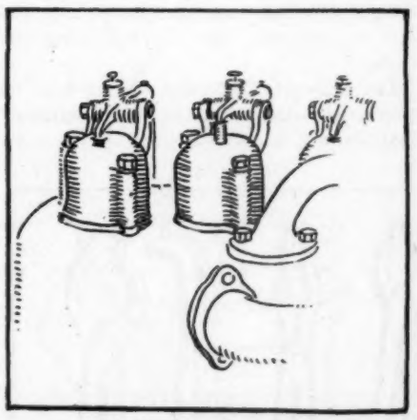


Fig. 4—Casings placed over the valve springs are efficacious in protecting them

If all tremblers vibrate strongly:

Remove the wire from the spark plug, hold its end about 1-4 inch from the engine casting, and close the circuit for that plug at the timer by turning the engine crank or placing a piece of metal so as to connect the timer terminal for that plug to the frame of the engine. The spark should jump the 1-4 inch gap. If not, look for poor insulation on the secondary wire.

If the spark coil has a visible safety spark gap, sparking at this point, when the wire is disconnected from the corresponding plug and held well away from the metal of the car, will indicate that the spark coil is in good condition. The primary circuit must of course be closed.

Remove the spark plug, connect its wire to it, lay the bushing of the plug against the engine and close the primary circuit corresponding to the plug under test. Notice whether the spark is strong between the plug points. If not, clean the plug or replace it with another. Even though the spark is strong when the plug is removed from the cylinder, the current may pass through mica insulation or dirt and grease on the insulating material when the plug is in the engine, owing to the higher resistance of the spark gap in the compressed mixture.

Put in a new spark plug.

Interchange the high-tension wires. The misfiring will occur at the plug to which the defective wire is connected.

See also compression test, sticky valve stem, carbureter troubles, timer troubles, defective spark coil, etc.

Old Clutch Comes Up

Editor THE AUTOMOBILE:

[2,907]—My clutch used to behave all right, but something seems to be at fault now. It is of the leather-faced cone type, and when I let it in gradually it suddenly seizes when a certain point has been reached. What is the matter? L. SMITH.

Stroudsburg, Pa.

Upon inspecting your clutch you will probably find the surface very dry. Put an ounce or two of castor or neat's foot oil on the cone, and distribute it carefully over the leather. This may be done by allowing one part of the clutch to slip over the other, then fastening the clutch open and thus letting it stand for about twelve hours. If the leather gets very oily some fuller's earth or chalk should be applied; it must be put on the clutch to absorb the surplus of oil. Sometimes it proves to be of advantage to clean the leather with gasoline before applying oil and chalk.

Little Bits of Motor Wisdom

Pertinent Pointers for Repairman and Driver

FULL SUPPLY OF TONGS REQUIRED—If the shop is to be equipped with a forge one of the requisites is a full set of tongs. The greatest point to remember in purchasing tongs is to have the handles of sufficient length from the pivot that there will be a good leverage in gripping a heavy article and that at the same time they will spring together close enough that the hand may grasp the ends of the tongs at the same time.

The tongs are made of various shapes, as seen in Fig. 1, so that they are adapted to the lifting of articles of different shapes and sizes. There are a number of uses to which these tongs may be put in governing the metal while it is in the fire, such as turning it over, raking the fire itself and performing the various little operations which will be found necessary in heating the work to the required temperature.

While at first sight it would seem that a full outfit of these tongs would be far from necessary, this is not the case if work is to be carried out on an extensive scale, for it is obviously impossible to pick up and throw a rivet with the same tool that is best in governing a piece of sheet metal. The uses of the other tools will suggest themselves by an examination of their shape.

The usefulness of these instruments, as of most other things about a shop, depends to a large extent upon the way in which they are kept. By this is meant not so much the deterioration of the metal as the arrangement of the tools themselves, although the upkeep of the instruments is a matter which will require some attention. The tongs should be placed in racks or suspended close to the forge, and in a light place, so that they may be readily seen. That is to say, they should be kept on the same side of the fire as that on which the operator stands while working, for it will be noticed that it is nearly impossible to see across a fire with any clearness. If they are placed in a rack they should be so arranged that they may be removed without great delay, as circumstances may arise that will demand hasty action on the part of the man who is performing the work.

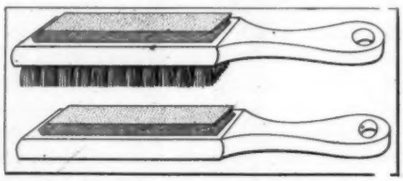


Fig. 2—File card and brush for cleaning files are truly necessary

The ends of the tongs will have to be occasionally cleaned so that the gripping qualities will not be impaired by the scale which forms on the parts subjected to the intense heat of the flames. This cleaning is done by means of files after the metal is cool. The filed parts are then dipped in kerosene and heated. Exceptional care, however, does not have to be devoted to the tools which are used in a forge shop, as they are all more or less of the heavy and rough variety.

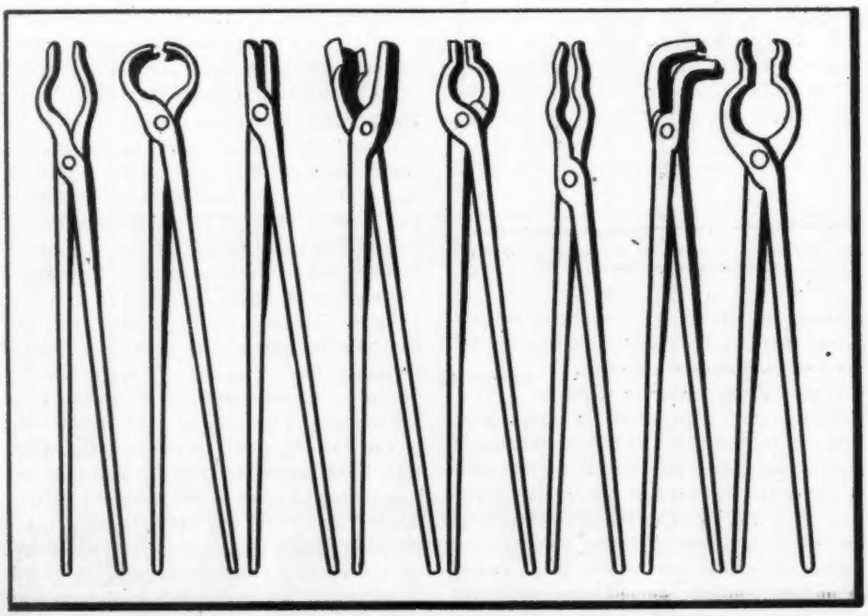


Fig 1—Every pair of tongs in the repair shop has a purpose of its own

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CLEANING FILES—Nothing will choke up so readily as a file, and when this is the case the tool is almost absolutely useless because the small particles wedge between the teeth of the file and gradually fill this space up so that in time where the choking process has been going on for an extended period the file will be reduced to little more than a flat piece of metal with occasional minute projections. Long before the file reaches this stage of inefficiency it should be cleaned, as shown in Fig. 3. The brush used for the purpose is seen in Fig. 2 and consists of either two parts or of one only. When composed of two parts there are two different types of brush, one being called a file card, while the other is known as a brush.

The files should be placed in kerosene to soak for a length of time, say over night, before the cleaning is attempted. The file brush and card is then called into use and the file scrubbed by running the brush vigorously along the file in a direction parallel with the teeth so that in this manner the wire bristles will dig the accumulated matter from the center of the groove between the teeth and clean it thoroughly. The file may be dipped from time to time in kerosene while the cleaning process is being carried out in order that the dirt may be kept soft enough for the brush to take effect. When dipping the file into the kerosene it may be shaken about so that the accumulated small particles will be well washed from the surface of the file.

Acid should never under any circumstances be used on a file to clean copper or other accumulated matter from the file. It is very true that the acid will attack the copper and cut it away from the file by combining with it chemically; still at the same time the acid will also affect the file and do it considerable damage if it is left in contact with it for any length of time.

The file card and brush is an inexpensive tool which may be purchased at a very small price from any hardware establishment. It will repay the expenditure incurred in its purchase by increasing the life of the file

and shortening the necessary time of the operations performed with these tools owing to the better cutting qualities of the tool when clean and sharp. The use of a little elbow grease will probably be required to clean the file thoroughly, but it will be amply repaid by the results obtained and the trouble saved by its use.

The item of time saved is often overlooked in small shop practice; but minutes saved, when added together, go a long way toward keeping down the expenses. Time is figured very accurately in dollars and cents in the larger concerns, and there is no reason why it should not be as carefully watched in the smaller shops; for although it does not amount to as large an item by itself, it is still the same relative part of the whole.

Forge Is of Use—The portable forge is an instrument which is of considerable use about the garage if it is fitted up to carry out repairs of a more complicated nature. There will be many cases where the parts to be repaired will require heating. When the parts to be thus treated are of sufficient size to be heated in the forge, that is, when the other and smaller means are not available to heat the part to the required temperature owing to its thickness, the forge will be a necessary purchase unless all the work is to be sent out.

The city man's garage will hardly be fitted with a forge if he is a private owner of a car, but if repair work is done on an extensive scale, as in a professional shop where outside work is carried on, it will of course be a necessity. A place where the forge will also be of use not only for automobile repairs but also for a variety of other work will be upon a farm or at a country home where a hired man or several, according to the size and equipment of the place, carry on all the work to be done on all the details of the establishment.

In the installation of the forge it must be remembered that various noxious fumes will be given forth while the work is being carried on. The forge should, therefore, be placed near the door in such a way that the heated gases given off by the more or less volatile fuel used are safely led outdoors instead of remaining within the building to produce severe headaches and other unpleasantnesses for the workmen who are engaged within the building. The piping should also be short so as to reduce the cost of installation as well as the trouble and expense of the upkeep of a more extensive ventilation system.

Another reason which would almost be sufficient in itself to determine the position of the forge in the building, especially if it be placed within the basement of the shop, as is generally the case with the forge, is the fact that it will be used in Summer as well as in Winter. The forge, owing to the high temperature at which it is worked, will give off a tremendous amount of heat to the surrounding air in spite of the most elaborate precautions to exhaust as rapidly as possible the gases given forth. It is well to install a good blower fan in the draught line to expel all the vapors from the shop as speedily as possible in order to keep it cool in the Summer season as well as to keep the air as pure as is possible while working with the forge.

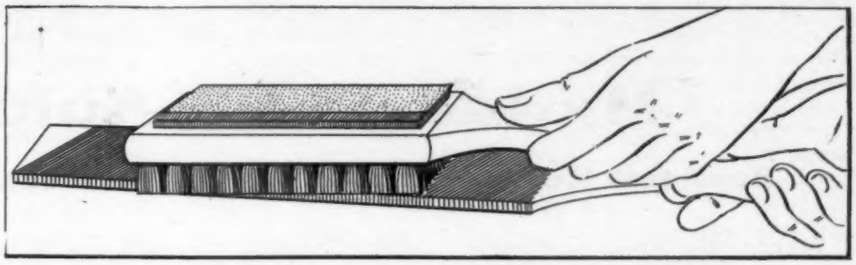

Fig. 3—After the file has been soaked in kerosene the brush is applied

If a trap-door is convenient it would be well to have the forge placed directly at the foot of the stairs leading down therefrom, as in this way the problem of leading the piping out of the basement becomes very simple, since there are no bends in the piping and hence nothing to check the freedom of the passage of the gases from the building. If there is a lathe in the shop it would be well to have a forge with such an arrangement that the belting can be attached to the fan; but if the hand variety must be installed, the type shown in Fig. 4 with the semi-hood is a good one to use.

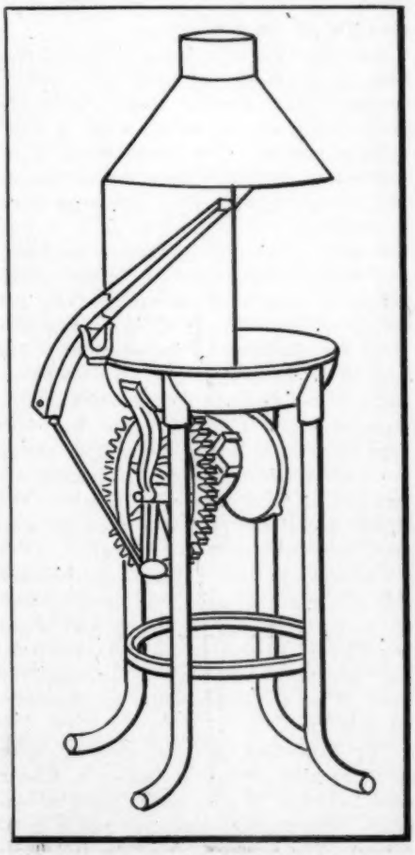

Fig. 4—A portable forge of the hand variety is equally useful in a shop and country garage

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Weak Mixture Caused by Leaks.—Backfiring into the intake will often be caused by a weak mixture and the carbureter will be blamed for the mischief, while in reality it is caused by a leaky intake manifold connection. This may be repaired in various ways, depending upon the method by which the manifold is connected to the cylinder. In case of a dog held by a stud bolt it may be that the dog has been sprung on account of too severe a strain having been placed upon it. Another cause of leakage where the manifold is held by means of a dog is that the gasket needs replacing. In this case it is necessary to carefully remove every part of the old gasket before replacing it with a new one, as it will be found that portions of the old gasket are very apt to adhere to the metal.

After having removed the old gasket the flanges should be filed bright so that there will be no chance of leakage on account of a burr being on the edge of the metal.

Where the manifold is held by means of a bolted flange the leakage is generally due to a defective gasket which is replaced in the same manner as the gasket in the case of a dog-fastened connection.

Care in Grinding Valves—It will very often happen that the emery used in grinding valves will fall into the cylinders if great care is not used to prevent such an occurrence. A preventative in the way of a piece of cotton waste placed in the cylinder port must always be used. In order that it will be a simple matter to withdraw the waste, a piece of string is turned about it before it is put into position. The loose end of the string is then carried out so that when the operation of grinding the valves is completed, it is only necessary to pull the string to remove the waste.

If the emery were to fall into the cylinder the damage which it would cause is almost immeasurable, as it would not only cut the cylinder and piston rings but it would also be very apt to get into the connecting rod and main bearings as well and destroy them.

My Ideal 1912 Automobile

Readers' Conceptions of What Next Year's Car Should Be

Wants His Money's Worth

EDITOR THE AUTOMOBILE:

The following is my ideal car for next year: The motor to be used on the five-passenger car will give full 40 horsepower, with a reserve sufficient to meet any emergency. The cylinders are made of close-grained iron and are cast separately for accessibility, while the heads are machined inside to obtain better scavenging and to insure equal compression. The bore is 5 inches and the stroke 5 1-2 inches, not larger, as excessive side pressure of the piston on the cylinder walls would be caused by the large offset used in this motor, and also because an excessively long stroke will neither allow throttling down to very low speed on high gear nor give as good torque at this speed.

The pistons are light and have their heads convex, which gives rigidity, reduces expansion and prevents the collection of oil. The piston pins are held stationary with the pistons to prevent their working loose and damaging the cylinder walls. The drop-forged crankshaft has three bearings of at least 5 inches surface each, and are of the best white brass. Being offset from the center of the cylinders, the surfaces of pistons and cylinders are relieved of much side pressure and, therefore wear, while the power efficiency at low speeds is increased. The flywheel is bolted to the rear of the crankshaft.

The camshaft, also drop-forged, with integral cams, runs on three large annular ball bearings, and is removable through front or crankcase without disturbing the motor's adjustment. The valves are all on the right side, and, like the ports, are very large to permit the free removal of all gases. The valve push rods are light and adjustable and, as they raise the valves direct, side thrust and noise are eliminated. They also are covered to keep out the grit. The manifold has easy bends and is of the ejector type, thus avoiding back pressure and increasing the motor efficiency.

The crankcase is constructed with three drop arms, giving a power plant of the three-point suspension type on an underslung frame. The right side of the case contains the main opening. The flywheel, heavy spring motor starter and disc clutch are all enclosed within rear of case, forming a unit-type power plant which, combined with the three-point suspension, overcomes the destructive effects of jolting, raking and the usual tendency to wear and to work out of alignment. The bottom of the crankcase is to contain the oil reservoir, and the oil pump is to be in an accessible place at the rear of the case, being operated from the camshaft by spiral gears. A sight-feed glass is to be on the dash to show that the pump is working. This system of lubrication is automatic, self-contained and requires no adjustment. A gauge is placed under the hood to show at a glance the amount of oil in the reservoir. The spiral-cut timing gears are to run in an oil-tight compartment of the crankcase and are to be so arranged as to be easily removed from the front.

The radiator is of the full honeycomb type and is flexibly suspended just behind the front axle. Water circulation is maintained by a large motor-driven centrifugal pump, with the magneto and cast aluminum fan driven by the same shaft on the left side of the motor. Dual ignition is to be had by one set of plugs over the inlet valves.

The clutch, which is mounted on large annular ball bearings, consists of thirty-three hardened and ground discs of saw-blade steel, and occupies the entire inner diameter of the flywheel.

Back of the clutch, but also housed in a bath of oil, is the automatic self-winding spring motor starter, which turns the motor over several times when a small pedal is pressed. The transmission, of selective type, providing three speeds forward and a reverse, with direct drive on third, is combined with the worm drive in unit with the rear axle, thus attaining simplicity and compactness as well as proper distribution of weight, which means safety and easy riding qualities, and, in combination with the disc clutch, tire economy. The housing of the gearset is of cast aluminum and is bolted direct to the pressed steel differential case. The high gear has four dogs, instead of many teeth, thus saving the danger of stripping. The shafts are mounted on adjustable roller bearings, and chrome nickel and vanadium steels are used here, as in other parts of the car.

The steering gear, mounted on the right side of the car, is strictly irreversible, with all its parts large. The worm and sector are both of chrome nickel steel, hardened and annealed, with an adjustment for wear. They are contained in an aluminum oil-tight case.

The cross-link of the steering gear is thoroughly protected, while a Caster type front axle is used for its many advantages. It is of the I-beam type and is drop-forged. The rear axle is of the full floating type, this being the most accessible and only mechanically perfect axle made. The brakes are of very large surface and, as both sets are of the expanding type, one set of drums is used, giving a neat appearance and keeping out the dirt. The brake rods, which are fitted with equalizers, are within the frame and are easily adjusted by large wing nuts.

The frame is made of deep channel section cold-pressed nickel steel, heat-treated, narrowed in front for short turning and has a very deep and wide middle section, which tapers towards the ends. It is of the underslung type. This system affords great safety in turning, as the springs are so nearly in line with the horizontal center of mass of the car that, instead of being vertically deflected, the load is applied to the side of the springs and, as the springs cannot be laterally deflected, the frame and car retain a horizontal position. The low center of gravity not only makes the straight-line drive possible (which economizes power, only one universal joint being used), but also tends to prevent skidding and turning over. The wheelbase is 132 inches for the five-passenger car, and 142 inches for the seven-passenger. The wheels are of best second growth hickory, with twelve spokes both front and rear. They are equipped with Dorian demountable rims and take 41 x 4 1-2-inch tires.

The gasoline tank is at the rear of the chassis frame and has a capacity of 25 gallons. This tank is constructed of heavy, double-riveted copper, divided by swash plates. It has a large filling cap and also a gauge. The gasoline is forced to the carbureter by air pressure automatically supplied by the motor. The tank being in this position reduces the danger of explosion or fire, and it is filled more easily and without disturbing the passengers.

The springs are long and wide with thin leaves. They are semi-elliptic, front 42 inches, rear 56 inches, and are built under the Pike patent.

The body—deep, low and roomy—is of the straight-line type. Ease and grace are combined. The aluminum footboards, front and rear, are long and sloping to match the deep tilt given the seats. Under the rear footboards are the tool boxes. The running boards are also made of aluminum, and the large hooded dash is fitted with force ventilators to make the use of the fore-doors comfortable. Just above these ventilators, and also built in the dash, are the side lights. The doors are opened electrically by pushing a button on their tops, the horn and lights being operated in a

similar manner. The current for these accessories is obtained from a large storage battery located under the front seat. The fenders closely follow the curve of the wheels and, like the hood, are constructed of very heavy enameled steel.

The price of the five-passenger car is $2,000.

The seven-passenger car has a double-drop, overslung frame, platform springs and six-cylinder, 60-horsepower Knight motor, but otherwise it follows the construction of the five-passenger car. The price is $3,000.

A full equipment is put on every car, absolutely no allowance being made if any part of it is not wanted.

WARREN B. MOULTON.

Riverside, Cal.

A 12-Year-Old's Ideal

Editor THE AUTOMOBILE:

I think most people will agree with me in regard to the following specifications which I have set down here for the ideal 1912 car:

The horsepower should be 35 to 40, which gives good power and low consumption of gasoline. The bore should be 4 1-2 inches and the stroke 5 inches, with four cylinders, cast in pairs, which gives the full rating mentioned above. The wheelbase should be 120 inches, giving enough room without making the car too heavy. The car should be shaft-driven, as that is more noiseless than chain drive. There should be three speeds with direct drive on third, geared 3 1-2 to 1. The clutch should be an asbestos fabric-covered cone clutch. The weight should be about 2,800 pounds, and I would use 35 x 4 1-2-inch tires that would give good mileage without being too large. The springs should be elliptic on the rear and semi-elliptic on the front.

I would have a double high-tension magneto system with two sets of spark plugs. The oiling system should be an automatic force-feed through a hollow crankshaft, throwing off oil and lubricating the walls of the cylinder, the camshafts, etc. The brakes should be 17 inches in diameter with a 2 1-2-inch face mounted on the rear axle hubs. The spark and gas levers should be mounted on the steering wheel on the outside, with a foot accelerator on the floor. The rear axle should be of the full floating type and the front axle a forged steel I-section.

The car should be fully equipped with top and windshield, and the cost about $3,000.

ALLEN ADDICKS.

Philadelphia.

$2000 for a Real Car

Editor THE AUTOMOBILE:

I cannot resist the tempetation to give my idea of what a pleasure car should be for 1912 or for any other year. My ideal car would have 130-inch wheelbase. The wheels would be 36 inches in diameter with wire spokes, as the wire wheel is both stronger and more resilient. The tires would be 36 x 4, on demountable rims. Both front and rear axles would be I-beam construction, and the frame would be of channel section, double-dropped and inswept at the forward end.

The motor would have six cylinders, cast three together and having seven roller bearings on the crankshaft. The bore would be 4 inches and the stroke 6 inches, and the motor would have the Knight sleeve-valve system. The lubrication would be positive by pump through the crankshaft and cylinder walls. Cooling would be by means of a honeycomb radiator mounted over the front axle and by a rotary pump. The radiator would have a screen fitted in front of it.

The transmission would have three speeds forward and reverse, with a bronze and steel disc clutch, and a thrust block of roller pattern to take up the thrust.

The body would be of aluminum and wood, five-passenger, fore-door, of simple panel design with the drive on the right side. The rear seat would be forward of the rear axle, and the front springs would be semi-elliptic and rear springs full-elliptic, as in the Mercedes. Final drive should be by side chains enclosed in oil-tight cases. This drive is absolutely noiseless and most efficient.

Finally, this car should be built of the very best materials with the best of workmanship, and sold for $2,000 by a real manufacturer. A financier would want $4,500 for it.

E. R. C.

Buffalo, N. Y.

Wants Knight Motor

Editor THE AUTOMOBILE:

My idea of an ideal all-around car is one with Silent-Knight motor of six cylinders, 3 1-2-inch bore and 5-inch stroke. The wheelbase should be 124 inches, tread 56 inches and the wheels should have 12 spokes all around with demountable rims and 36 x 4 1-2-inch tires.

The emergency and foot brake should be on rear wheels, external expanding inside drum for emergency and outside drum for foot brake, 15 inches in diameter, 3 inches wide, with drum bolted to each spoke. The gearset should have four speeds and reverse mounted on annular ball bearings, gears and shafts of nickel steel.

I would specify shaft drive inclosed in torsion tube with one universal joint, drive shaft, pinion and bevel gears nickel steel, rear axle flull floating ball bearing of nickel steel, front axle and steering knuckles also nickel steel. Steering should be by irreversible worm and gear, arm and all connecting rods alloy steel of ample dimensions; this is one of the most important parts of the car and should be extra strong. Springs semi-elliptic in front, three-quarter elliptic on rear, of vanadium steel.

The carbureter should be double-jet, hot-water jacketed, controlled by hand throttle on steering wheel and foot accelerator. Ignition should be by high-tension magneto, lubrication force feed and splash system. The clutch should be a multiple disc, running in oil.

The body should have fore-doors, top, windshield, electric lights. Klaxon horn, trunk rack, tire irons, speedometer, coat and foot rails. Gasoline tank should be hung from frame on rear with pressure feed to carburetor, frame pressed steel heat treated, right-hand drive steering wheel 18 inches in diameter and set low enough to be convenient. There should be about 10 inches clearance.

H. A. TIBBETTS.

Alton, N. H.

$1250, If Quantity-Produced

Editor THE AUTOMOBILE:

The motor of my ideal car would have four cylinders of 4 1-4-inch bore and 4 3-4-inch stroke. The cylinders should be cast in pairs, allowing a three-bearing crankshaft, and the valves should be of the poppet type, extra large, enclosed, and all on the same side of the motor. The crankshaft should be offset 1 inch. The splash system of lubrication should be used, and means should be taken to prevent the oil from running to one end of the crankcase when ascending or descending a hill. I prefer a Splitdorf magneto, and a carbureter which is water-jacketed.

I should prefer the clutch and emergency brake to be operated by a pedal to the left, with a locking device, and the service brake by a pedal to the right. This method of control would be superior, I think, to that suggested by the correspondent who wants the clutch and service brake operated by the same pedal, in that it would allow the service brake to be applied without releasing the clutch when descending a steep hill with the throttle closed and the engine acting as a brake. Either method, however, is good, since it dispenses with the hand lever, which is a nuisance in a fore-door car. The gear shift lever should be low enough to permit easy access to the driver's seat from the right-hand side of the car.

The wheelbase should be about 112 inches, and the body hung low to add to the beauty and riding qualities of the car. I should prefer 34 x 4 quick detachable tires, with an engine-driven air pump for easy inflation. A clear vision windshield would make driving more of a pleasure. A B. and L. Castor front axle would add to the ease of driving and the safety of the occupants of the car.

If this car could be produced in quantity, I fail to see why the price should be more than $1,250, including top, windshield, electric lights and self-starter.

Lancaster, O. E. R. B.

Details of the G. & A. Carbureter

WHILE the desirability of a perfectly automatic carbureter is hardly to be denied, practice has not proved the possibility thereof until this day, and designers have resorted to the construction of semi-automatic working carbureters, *i.e.*, those in which either gasoline or air intake is fixed.

Since internal combustion practice has shown that a motor is much more sensitive in regard to a variation in the quantity of the fuel rather than to an altered amount of oxygen, there seems to be an advantage in the application of a stationary gasoline nozzle. The great army of automobilists are only too apt, in case of a slight disturbance of the working organs of the motor, to try to remedy the trouble by changing the carbureter adjustment, which in nine cases out of ten is innocent of the trouble laid at its door. For this great number of motorists the use of an unalterable gasoline adjustment which serves for a wide range of speeds must be considered a blessing. Thus after deciding on the correct construction of the gasoline supply and nozzle it remains to so design the air-supplying members that they lend themselves as perfectly as possible to the varying demand of the motor for mixture.

In the G. & A. carbureter, a full view of which is seen in Fig. 1, the gasoline on its way to the engine flows through a float chamber, where its maximum level is slightly above the nozzle outlet, which is placed in the plane where the upper widening of the Venturi tube sets in. In Fig. 2, depicting the float chamber in section, the manner of its operation is shown. The top of the chamber is flanged to permit of fixing the cover thereto, and under the cover, in the inner face of the chamber wall, is clamped a plate P1, which, like the cover, is punctured to permit the stem of the needle valve to slide through it. Plate P1 has two vertical downward extensions, pierced by two pins P on which are hinged two weights W and W1, connected by a small round brass plate integral with the needle valve stem. When the chamber is empty the brass float F1 assumes its lowest possible position and the weights resting on it and fulcrumed on their pins lift the needle, thus making a free way for the gasoline into the chamber. If gasoline is admitted it lifts the float as high as the weights resting on it permit, at the same time depressing the needle, which closes the valve when the gasoline level is slightly above the nozzle N1 leading up from the float chamber to the mixing chamber C1, so that the fuel flows out into same. The needle valve finds its seat in the brass fitting shown below the float chamber and which is capable of being removed from its place to drain off the gasoline or remove whatever foreign substances may have accumulated in the drainage space closed by plug D1.

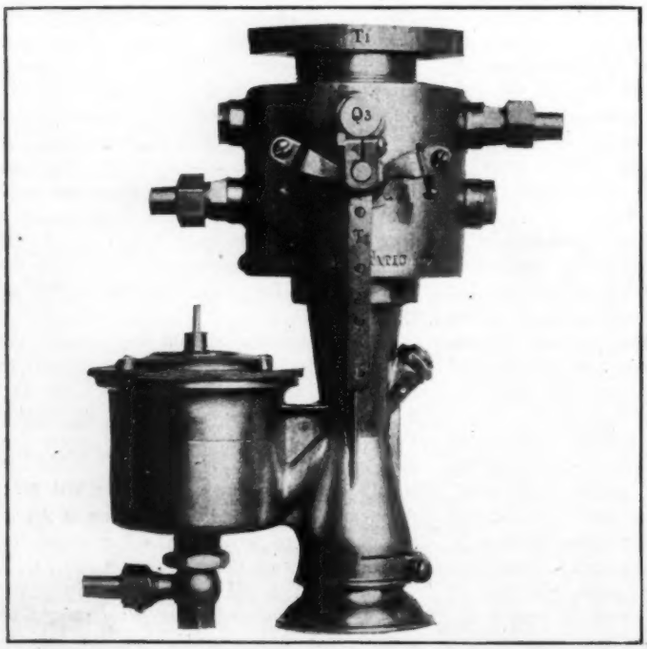

Fig. 1—Outside view of the G. & A. carbureter, indicating strength and compactness

The flow of air is regulated by means of the common lever and throttle, the butterfly being shown at B1 in the mixing chamber. The air enters at the lower end V1, of the Venturi tube, after passing through a 30-mesh strainer S1, which serves to keep foreign matter out of the tube. This strainer is attached to a brass funnel of a diameter considerably larger than that of the pipe in order to take in as much air as possible. The Venturi tube, 1 1-2 inches wide at its lower end, narrows upward to a diameter of 9-16 inch and rises then as a parallel pipe for about half an inch. The parallel portion of the air passage is bored to provide a passage for the gasoline nozzle which ends at the upper level of this parallel portion and is almost centered in the pipe. The upper part V2 of the Venturi tube is 3 5-8 inches up to the butterfly, and serves as the mixing chamber for the gasoline and air.

The auxiliary air inlet supplying the motor with an additional amount of air at the higher speds has been constructed in the shape of a series of ball checks. Twelve balls of various diameters rest in cages upon holes in the part M2 of the mixing chamber. About 7-16 inch above the plane of these holes an annular ring is provided. When the throttle is fully opened, the suction of the motor lifts these balls, and draws in air through the seats of the ball valves. Naturally, the smallest balls are first lifted, but their seats represent only small inlets for the outer air, and a stronger suction of the motor lifts the larger balls in their order of size, drawing in more and more air.

As the gasoline leaves the nozzle and is taken up by the swift-moving air streaming toward the motor, the liquid is atomized, *i.e.*, torn apart to form very small globules. But as gasoline cannot be burned completely except when in the gaseous state, designers of carbureters have found it of advantage to preheat the mixture of air and gasoline globules so as to completely vaporize the fuel before it enters the combustion chamber. This is done by water-jacketing the mixing chamber, and the water jacket is seen in Fig. 2 at J1. Apropos of water jackets in carbureters it may be well to remember that a fixed amount of gasoline has a certain heat of evaporation, that is, it absorbs a certain number of thermal units when converted into a vapor. In water-jacketing a carbureter, it is necessary for the designer to bear this in mind, since if not enough heat is supplied by the water to the mixture, the fuel will not be evaporated as completely as is to be desired. On the other hand, if too much hot water passes through the jacket and therefore more than the necessary heat is taken up by the gasoline, the fuel will enter the cylinders not only in vapor form but charged with a certain amount of heat, which goes to expand the mixture—even before it enters the combustion chamber—so that a lesser amount of mixture per stroke is taken into the cylinders. The varied demand for gasoline of the motor at different speeds as well as the changing atmospheric conditions render it impossible to

obtain, in a motor, at all times the ideal condition meant by what is called a totally cold compression, and it is therefore left to the designer to consider in his calculations as wide as possible a range of conditions of engine operation and to adapt his design of the details to the average of the requirements found out by his experiment.

The hot water enters and leaves through connections K1 and K2, and the illustration also shows one plug Q4 above one fitting and one Q2 below the other, so that in case a connection interferes with the crankcase or another part of the motor, a plug and fitting situated above one another may be exchanged, their threads being the same, making the connection and plug interchangeable. A third plug Q3 is so placed that it regulates the maximum and minimum opening of the throttle by holding up either of the two side members of the throttle lever T1. A fourth plug is placed on the casting opposite the plug Q3.

One more plug Q1 can be seen in Fig. 2, and this opens the passageway permitting of access to the nozzle when the latter is adjusted before the carbureter goes on the car. This plug is not to be removed except when the work named is being done, since the user of a car will find it of no use, but perhaps of disadvantage, to tinker with the nozzle which is made stationary in order not to be tinkered with.

The top piece T1 is threaded to screw into the top of the space above the throttle and it carries a flange of 7-16 inch thickness for attaching the carbureter to the manifold.

The G. & A. Carbureter Company, of 250 West Forty-ninth street, New York City, makes this carbureter. Several kinds of nozzles are made to fit into the 1912 models of this carbureter, and the company itself in fitting a carbureter to an automobile selects the nozzle that will give the best service and adjusts it to attain this end. When this work is being done it is necessary to unscrew the plug opposite the nozzle outlet in order to get at the threaded pipe connecting float and mixing chambers of the carbureter. After this the plug has filled its mission.

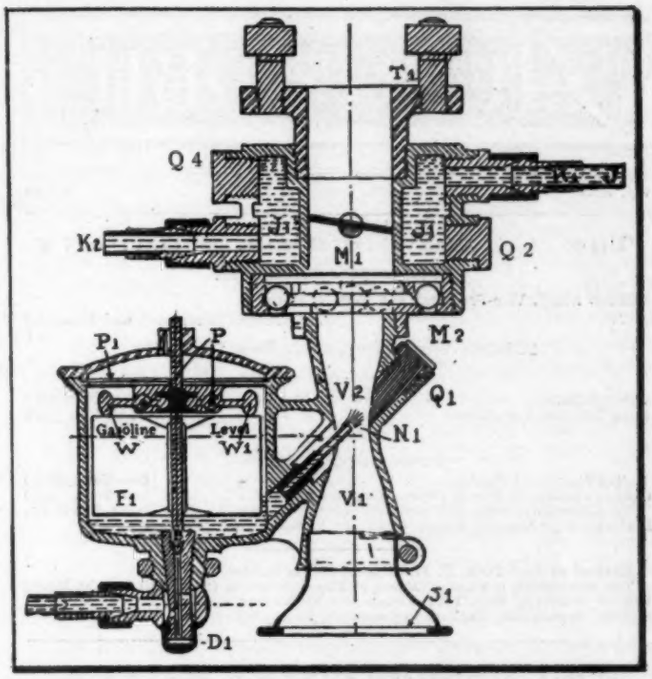

Fig. 2.—Cross section of G. & A. carbureter, illustrating principle of automatic operation

GRITTING OF LONDON STREETS.—As the time of the year when street surfaces are often greasy and slippery, owing to weather conditions, is now approaching the Roads Improvement Association of England has addressed a letter to all the Metropolitan Local Authorities of London urging that any material that is used for the gritting of the streets should be as small as possible. It is pointed that the larger material causes damage to rubber tires and is of no service as a preventative of slipping until crushed. The gritting question was very fully considered at a conference between the Institution of Municipal and County Engineers and the Roads Improvement Association last June. The conference then held unanimously urged the thorough cleaning of all highways so as to reduce the necessity of gritting to a minimum and that any material that is used for the purpose should be as small as possible compatible with efficiency.

Calendar of Coming Events

Shows

Nov. 20-25.....Indianapolis, Ind., Fall Show, Indianapolis Automobile Trade Association.
Dec. 30-Jan. 6.....Buffalo, N. Y., Annual Show, Seventy-fourth Regiment Armory, Buffalo Automobile Trade Association.
Jan 2-11.....New York City, Hotel Astor, Importers' Salon.
Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.
Jan. 6-20.....New York City, Madison Square Garden, Annual Show, Motor and Accessory Manufacturers.
Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers; also Motor and Accessory Manufacturers.
Jan. 13-27.....Philadelphia, Annual Show, First and Third Regiment Armories, Philadelphia Automobile Trade Association.
Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.
Jan. 13-19.....Milwaukee, Wis., Auditorium, Fourth Annual Show, Milwaukee Automobile Dealers' Association
Jan. 22-27.....Detroit, Mich., Wayne Gardens, Eleventh Annual Show, Detroit Automobile Dealers' Association.
Jan. 22-27.....Providence, R. I., Providence State Armory, Rhode Island Licensed Automobile Dealers' Association, Automobile and Accessories Show.
Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week.
Feb. 3-10.....Montreal, Canada, National Show, Drill Hall, Automobile Club of Canada.
Feb. 5-17.....St. Louis, Mo., Coliseum, Annual Show, Pleasure cars, first week. Commercial vehicles, second week.
Feb. 12-17.....Kansas City, Mo., Annual Show, Convention Hall, Combined Association of Motor Car Dealers.
Feb. 14-17.....Grand Rapids, Mich., Third Annual Show.
Feb. 17-24.....Newark, N. J., Fifth Annual Automobile Show, New Jersey Automobile Exhibition Company, First Regiment Armory.
Feb. 17-24.....Minneapolis, Minn., National Guard Armory and Coliseum, Annual Automobile Show, Minneapolis Automobile Show Association
Pittsburg, Pa., Second Annual Show, Exposition Bldg.,
Feb. 17-24..... Pittsburg Auto Show Association, Inc.
Feb. 19-24.....Hartford, Conn., Annual Show, Automobile Club of Hartford, State Armory.
Feb. 20-24.....Binghamton, N. Y., State Armory, Third Annual Show, Automobile Dealers' Association.
Week Feb. 22.....Cincinnati, O., Annual Show, Cincinnati Automobile Dealers' Association.
March 2-9.....Boston, Mass., Tenth Annual Show, Boston Automobile Dealers' Association, Inc.
March 4-9.....Denver, Col., Auditorium, Annual Show.

Meetings, Etc.

Nov. 20-24.....Richmond, Va., First American Road Congress, under auspices of American Association for Highway Improvement.
Nov. 22.....Road Users' Day, under direction of Touring Club of America.
Dec. 20.....New York City, Waldorf-Astoria, Annual Banquet of the Automobile Club of America.
Jan. 18-20.....New York City, Annual Meeting of the Society of Automobile Engineers.

Race Meets, Hill-Climbs, Etc.

Nov. 9-10.....Chicago, Team Match, Amateurs vs. Trade Members to Waukesha and Return, Chicago Automobile Club.
Nov. 9, 10, 12.....San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 13.....Harrisburg, Pa., Economy Run, Motor Club of Harrisburg.
Nov. 27.....Savannah, Ga., Vanderbilt Cup Race, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Nov. 30.....Savannah, Ga., Grand Prize Race, Savannah Automobile Club.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

THE AUTOMOBILE

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THE CLASS JOURNAL COMPANY

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The Manufacturer's Burden

THE old adage of "Great oaks from little acorns grow" has its adaptation in the automobile field, and particularly in the contest departments. This was well illustrated in the recent reliability run of the Chicago Motor Club, in which some of the heaviest penalties were caused by very minor incidents at the start. One contestant had a little leak in the gasoline line where it joins with the base of the gasoline tank. This started a long line of trouble. The car body with fenders had to be taken off before the job could be properly soldered, a process which consumed several hours. But this work constituted only one chapter of the affair. While the repairs were being effected the car was falling behind on its schedule; this meant fast driving to catch up. The fast driving resulted in an accident with a farmer, who refused to pull a little to the right side of the road to allow the contesting automobile to pass. The net result was an accident, fenders and running boards torn off against a fence and more penalties for work and being late at the night control. All of this started from a little gasoline leak. Every maker would smile at a buyer who talked seriously over what he considered a weak gasoline feed line from the tank to the carbureter, and yet this proved in this contest a most serious affair, and one that would cost a private owner a good deal of money. The cause may have been a poor soldering job in the assembly room, or it may have been due to excessive vibration caused by fast driving. No matter what the cause, the result is known, and the moral to all car owners and car builders is that a big expense or repair bill may originate with what many would consider a very trifling trouble. The lesson to be gathered is that all of the little details on an automobile should be looked after, because the complete car has but the strength of its weakest part.

But the contest in question afforded one or two other examples of what the little acorn fable is intended to convey. One other contestant had continuous trouble due to a connection on a dry cell breaking off. The connection was broken and the car could not be started on a cold morning on the magneto. Continuous cranking and straining on the starting crank broke the starting crank bracket and more or less trouble followed. Each time the car had to be started it had to be pushed. Two examples will suffice. The truth of the value of the small part is apparent.

The lessons taught by this run should be taken to heart by every maker. They will, if properly applied, prove the greatest salesman of new cars, and they will prove to be big money savers to the automobile owners. Nearly every trouble in a car starts from some little source. The car owner and driver fails to notice the little irregularity which could be corrected in less than 5 minutes. He keeps on driving his automobile from day to day; the trouble grows worse, not perceptibly at first, but soon the owner-driver becomes conscious that something is wrong. He tries to locate it and soon finds that there is a long chain of difficulties; one little trouble has led to another and soon half a dozen parts of his machine have become infected. The repair means several days in the garage, and several days in the garage means a whole lot of money in the repair bill. This big repair bill sets the owner-driver thinking and in nine cases out of ten he comes to the conclusion that what is needed is an inspection department by the branch house or the dealer. The owner-driver is not an apt mechanical physician; he has not the stethoscopic ear to interpret the little knock in the motor that may, if not corrected at once, lead to a new set of bushings for the crankshaft and connecting rods at an outlay of more than $100. He is not capable of detecting the little clutch slip that, if not corrected at once, may require a new facing or some new disks. He cannot tell if the motor is getting enough lubricant or if the cylinders are filling up with carbon; in a word, he is not an automobile physician. He is not an expert at diagnosing troubles and, worse yet, he is not adept at prescribing remedies. A real doctor of automobiles and their troubles is needed. Each car owner cannot have his private physician. The car maker should supply the physician. The physician is the factory expert—the man who has worked through every department of the factory; the man who understands every in and out of the entire car; the man who can tell in an instant the cause of a certain irregularity, and who is as quick to provide a remedy; the man who can take a 15-minute ride once a month with every car owner and who can tell them in that time if every part of the car is working all right, and if any little symptoms of trouble are noted can suggest the remedy.

The answer to the need for automobile physicians points to the service department, whether conducted directly by the factory or by a competent dealer. The average repairman does not solve the problem. He takes the place of the patent medicine man in the medical field. He is supposed to be able to repair every make of car. How foolish such an idea! How can he make a good repair unless entirely familiar with the construction of the car parts and also familiar with the materials used in these parts and the treatment given these parts in the processes of manufacture? It is true that the repairman can do a great many things and can do them well, but often he fails to do a great many and does a host of others very poorly. He can do the ordinary work well, but fails badly when the more important jobs

have to be handled. A few examples will suffice to illustrate this: The repairman in some Nebraska city could not be expected to make a good job with a repair on a bent steering arm on a certain make of car when he was ignorant of the grade of steel used in this part and did not know the heat treatment it was given when it was being made. The same applies to springs, leaves of which have been broken and a temporary repair is wanted until a new spring can be had. In some cases the repairman makes a perfect job, one that will endure; but in others the repaired leaf has not given a day's service. The meaning attached to this is that by a plan of guess work he gave treatment that was well suited in one case; it was just the kind of treatment that grade of spring steel demanded, but in the other case the treatment was perhaps the worst that could be given. Here is where the man trained in the factory can give good service at the branch houses or service departments throughout the country. The modern car calls for trained workmanship and scientific workmanship. In plenty of the cities throughout the country the head repairman is a person who has graduated from some blacksmith shop field. He has never had a thorough experience in the automobile field. His case is similar to calling in a veterinary to treat a human being. Skilled treatment is needed and a man skilled in the treatment of one make of car may be a dismal failure in similar treatments on other makes of cars, simply because different materials are used and these materials have been given different treatments in the processes of manufacture. The crux of the entire situation is that the car maker must look after his customers, otherwise they will get away from him. It will pay each automobile maker to establish service departments in the big centers of population where his car is sold. It will pay him to have a free inspection department, in which once a month each owner can have his car given a 15-minute official run under the control of the automobile physician. If it is running well, nothing has to be done, but if some trouble is developing it can be nipped in the bud. This nipping of troubles in the bud saves the reputation of the car and also saves the pocketbook of the owner. If some work has to be done on the car the owner should pay labor rates for it, and if it be advisable to add some new parts, then he should pay a legitimate price for these parts. It is much better for him to pay $1 to rectify a trouble to-day, which if let run would mean a bill of $100 in less than a month. Service departments are needed. If a maker cannot install gilt-edged departments at once, install poorer ones; but make a start. If it is not satisfactory to open branches and erect big, costly buildings, then install humble quarters with the dealer. But give satisfaction to the owner. Give him intelligent repair service and give it to him at a reasonable cost. Do not try to make money out of the owner because of the failures in your designing or manufacturing departments in turning out automobiles that are not perfect. Be ready to carry your share of the burden. The welfare of the entire automobile industry demands this.

Savannah Card Filling

SAVANNAH, GA., Nov. 8—With the entry list for the four big road races to be decided the latter part of this month reaching a total of thirty-one to-day and with still a full week intervening between to-day and the closing of the entry box, indications point to the coming race meeting as the greatest in the history of automobile racing.

It is understood that there will be at least twenty-five more cars entered and there is a strong probability that even a larger number will try conclusions. The only Indianapolis factory entries so far received have been those of the Marmon fleet consisting of two cars in each the Grand Prize and Vanderbilt and three in the Savannah trophy race. Among the Indiana cars expected in addition to the Marmons are several from the National factory, a Cole or two, a Westcott and perhaps a Stutz car.

Following are the official entries:

G and Prize—3 Fiats, 3 Benz, 2 Marmons, 2 Loziers, 1 Mercedes.

Vanderbilt—2 Mercedes, 3 Fiats, 2 Marmons, 2 Abbotts, 2 Loziers.

Savannah Challenge—2 Cases, 2 Abbotts, 3 Marmons, 2 Mercers.

Tiedeman—2 Abbotts, 3 E-M-Fs.

All of the net profits of the races will go to the military of Savannah. To the efficiency of this well-drilled body is due the absence of accidents on the course in the past, and this disposition of the receipts meets with the approval of all concerned. The detail will consist of six companies of the First Infantry, four companies of heavy artillery, a troop of cavalry, a battery of light artillery, and two divisions of naval reserves. Sheriff Screven and his forces will also assist in the work of guarding the 17-mile course.

Akron Growing Rapidly

AKRON, O., Nov. 6—Due largely to the development of the automobile industry, Akron, the "rubber town," has had the following increases in the five years 1904 to 1909, according to reports just made public by the United States Census Bureau. Division of Manufacturers:

One hundred and eighteen per cent. in the value of manufactured products; 111 per cent. in the value of materials used; 103 per cent. in the amount of capital invested, and 32 per cent. in the number of manufacturing establishments. This is a record for cities of Akron's grade and population, 70,000.

If the figures were taken at the close of 1911 instead of 1909, the results would be still more striking, for the Diamond Rubber Company, the B. F. Goodrich Company, The Firestone Tire & Rubber Company, The Goodyear Tire & Rubber Company and all other tire makers have developed considerably of late.

Thirty thousand Akron people are supported, directly or indirectly, by the rubber industry, and in that industry all possible pressure and concentration is directed to the tire branch.

It is significant that in the improvements and additions made to Akron rubber factories, the best of material and expensive innovations are used. This is explained by leaders of the industry on the ground that they are certain the automobile industry will continue to grow and develop indefinitely and they must build not only for the present, but for the future.

Pittsburgh to Have Two Shows

PITTSBURGH, PA., Nov. 6—There will be two shows held in this city next Spring. The sixth annual show will be held in Duquesne Garden in February, and the second annual exhibition of the Pittsburgh Auto Show Association, Inc., is scheduled for Feb. 17-24.

National Wins Phoenix Desert Race

PHOENIX, ARIZONA, Nov. 7—For the first time in the history of automobile racing, a Western event of national importance has been won 2 years in succession by the same man. Harvey Herrick, who won the Los Angeles-Phoenix road race a year ago in a Kissel car, this year piloted a National to victory. Ralph Hamlin, second last year in the Franklin, used the same machine and took the same position. The National's running time over the 542-mile course was 20 hours and 22 minutes, while that of the Franklin was 22 hours, 54 minutes, 35 seconds. The Midland car, driven by Tom Carrigan, captured third honors, negotiating the distance in 24 hours, 21 minutes and 24 seconds.

The course is a trying one and tested the mettle of men and cars to the utmost. Machines and drivers were covered with thick coats of dust upon their arrival. Several had no sleep from Saturday morning until late Monday night.

For days before the start of the race, Saturday night, there had been no rain and the course was in as good condition as it ever was, but at its best is terrifying. There are stretches of 50 miles without water or human habitation. Herrick took the lead right at the start and maintained it to the finish. He could have finished an hour sooner. Herrick's proverbial luck and the National's staying qualities carried them into San Diego for the special prize of $1,000 for the first car to reach that place, far in advance of the other machines. Then Herrick was off over the sands of southern California, across the brush-covered flats of Mexico to Yuma, Arizona, where he won another $1,000.

He pulled into Yuma, 330 miles from Los Angeles, at 11:49. Sunday morning. His running time had been 12 hours and 14 minutes. Leaving Yuma at 5:03 the next morning the National shot away for Dome, 20 miles distant. He went into control only 1 minute ahead of the Mercer. This was the nearest Herrick came to losing his lead. All the cars were held in control at Dome until they could be hauled across the Gila River. The Franklin and Mercer pressed the National closely this side of the river but gradually Herrick pulled away. The last 150 miles was easy for him, he did not let out the National at all. Once E. Swanson, his mechanician was jolted out but Herrick playfully ran on half a mile, forcing Swanson to scamper along to keep up before he would let him in. At 1:51 1-2 Monday afternoon the National crossed the line at the Arizona Fair Grounds.

Herrick, who was born and reared in Phoenix, received the applause of 7,000 people. The Franklin arrived at 2:35. Hamlin drove a splendid race and but for an unfortunate accident on the California desert might have beaten Herrick. The Franklin broke a spring near El Centra and spent over an hour in a blacksmith's shop. Tom Carrigan took third place with the Midland, a dark horse, because he had better luck than drivers of heavier and faster cars. He had practically no trouble along the route.

A protest which may prevent the Midland being formally awarded third money has been filed with the A. A. A. representative by Louis Nikrent, driver of the Buick No. 12. Nikrent was getting along pretty well until he was this side of Yuma, when part of the Buick's machinery began to give trouble. He decided that he had no chance to win with his car, so when the Buick No. 16, driven by Billie Ferguson, of Bisbee, Arizona, came along he took its wheel. Ferguson's mechanician, Carey King, was left to help Nikrent's mechanician get the disabled car into Phoenix, but the mechanics beat their drivers. They claim that they arrived at 5:03 but found no one to check them in. They were put down as arriving at 5:16. If the protest of Nikrent is allowed, No. 16 will be given third honors. It is claimed that since Nikrent deserted his own car it was disqualified. The Buick 16 was checked in fourth by the local officials, its running time being 26 hours 26 minutes 35 seconds.

The most serious accident of the race occurred to the Fiat. A mile east of San Diego the lights went out and the car crashed into a telegraph pole. Teddy Tetzlaff, the driver, was hurt, while Felix Magone, his mechanician, was seriously injured. Both are in hospital at San Diego. The Fiat was destroyed.

Earl Fancher, mechanician to Earl Smith, the Maxwell driver, is also in San Diego hospital. Twice between Los Angeles and San Diego the Maxwell turned over. Just out of San Diego it turned over the third time, Smith and Fancher being pinned underneath. Roger Stearns, driving the Stoddard-Dayton, stopped to give assistance and lost his chance of beating the National into Yuma. Smith was able to finish the race with another mechanician.

At Santa Ana the Pope-Hartford, a Phoenix car driven by W. D. Tremaine, had one rim fly off the front wheel and crashed into a curbing, breaking two more wheels. It was delayed there 12 hours until new wheels could be secured. Tremaine drove on to San Diego, Yuma and Phoenix and arrived second, though his running time was so great as to preclude him from participation in the prize money. His plucky race after his luck was one of the most sensational features of the contest. His running time between Yuma and Phoenix was better than that of any car except the Cadillac.

W. W. Bramlette, in the Cadillac, made a good showing this side of Yuma, but the other side his time was slow. Hard luck stuck to Roger Stearns and the Stoddard-Dayton. Before he stopped to assist the Maxwell, he had had trouble. Despite delay and trouble he was only 47 minutes behind the National at Yuma, in running time. He had to stop out of control the next morning to put in a new axle and that put him out of the running.

The Mercer, driven by Harris Hanshue, was a serious contender until Dome was passed. It was right up with the Franklin and National but Hanshue got lost and broke a steering knuckle and did not arrive until midnight.

The Flanders negotiated the distance between Los Angeles and Yuma in 16 hours and 43 minutes, putting it in seventh place. A mile out of Yuma it was put out of the race.

Bill LaCassel drove a good race in the E-M-F, arriving in Phoenix at 9:10 Monday evening. Minor troubles delayed him on both sides of the river.

One of the favorites, the Cole, made a poor showing in time. Its engine was jarred loose and it dragged all the way. The Cole arrived this morning.

The Lexington, driven by Charles Bigelow, made a good showing for a comparatively light car. It arrived about midnight after having experienced various tire and engine difficulties.

Only meager reports have been received of the Case, a Phoenix car driven by W. F. Brong which was last seen in a ditch between San Diego and El Centra. Brong and his mechanician were asleep beside it.

Election Day Races at White Plains

WHITE PLAINS, Nov. 8—Election Day was celebrated here with a series of automobile track races on the half-mile track of the fair association. Three races were run: Maxwell (Costello) winning at 10 miles; Abbott-Detroit (Mulhall) at 5 miles and Mercer (Monroe), free-for-all at 10 miles.

National Wins Thrice at Minneapolis

MINNEAPOLIS, Nov. 6—Facing a raw wind blowing across the city, 500 spectators Saturday witnessed the hill climbing contest which was held on Columbia Heights hill under the auspices of the Minnesota Motor Club. Barring the low temperature, conditions were ideal, the road having previously been placed in almost perfect condition.

The time was taken by flagging the timers at the finish line when each car crossed the starting tape. As a result several watches were at variance, being in one instance 6 seconds apart.

National (Reiter), entered by the Northwestern Overland Company, captured three prizes, the George B. Levy, Prest-O-Lite and Hollis Electric trophies going to it. This car won in Division 4 for cars of from 301 to 450 inches displacement, the free-for-all event and for making the best time up the hill regardless of class.

This climb marked the initial appearance of National cars in competition under sanction in the Northwest. The best time recorded for the National was in one of its early trials, when it was piloted up the grade in 19 3-5 seconds. Its best time in the free-for-all was 20 3-5 seconds. Tying for second place in the free-for-all event were the Colby and the Ford entrants, both taking the ascent in 21 3-5 seconds.

In Division 1 the Flanders won the Republic Rubber Company trophy for cars of 160 inches displacement and under. Its time was 23:27 seconds, the average computed by the timers. This car was entered by the Studebaker Corporation and was driven by Simon Rothenberger. There was no other contestant in this division.

By making the fastest time for cars having from 161 to 230 cubic inches the Ford driven by John McDowell secured the trophy given by R. J. Randolph. Al. Wilson's Jackson qualified for the Automobile Equipment trophy, the second prize in this division. His time was 22:49 seconds. Gus Hansom, in a Ford; Dick Stanton, in a Cutting, and an Overland were the other contestants. The time between them was rather close.

It was a pretty fight between the Colby and the Everitt, driven by Matt Miles, when these cars lined up for prizes offered in the 231 to 300-inch displacement class. The Colby won, making the distance in 22 1-5 seconds. By its victory it becomes the possessor of the Empire Tire & Rubber Company's trophy, while that offered by the Superior Oil Company goes to the Everitt, entered by McArthur-Zollars-Thompson.

Art Murphy in a Speedwell, entered by the Hudson-Thurber Company, captured the Van Tilburg Oil Company's cup by finishing second in the event for cars from 301 to 450 inches. This was the event in which the National finished first.

In the big class, a Peerless, entered by T. M. Anderson and driven by Ase Precourt, ran with regular touring body and full equipment. This car won the event in the 451 to 600 class, making the climb in 27 1-5 seconds. The Pure Oil Company had offered a trophy for the winner. M. R. Nyman in an Alco finished second in the event. His time was 31 second. The Alco also was equipped with a heavy body.

The climb was 1,300 feet long, with an average grade amounting to 6.63 per cent. The greatest grade at any one place was 10.4 per cent., while the total elevation was 86.2 feet.

Quakers Abandon Reliability Run

PHILADELPHIA, Nov. 4—Owing to the small number of entries received for the Philadelphia Reliability Run, scheduled for November 2-4, and the general lack of interest in the event, the Quaker City Motor Club decided not to attempt to hold it. The club regretted to give up the project, as its runs have always been so successful and so productive of pleasure and profitable experience to both participants and officials.

It is thought that the lack of interest shown in the run is due, in some measure, to the concentration of the attention of the automobile public of Philadelphia on the Fairmount Park Race.

Wisconsin to Educate Public

MILWAUKEE, Nov. 6—The new Wisconsin Highway Commission created by a law appropriating $350,000 annually for State aid for highway improvements will on November 14 put in effect a comprehensive educational plan covering about half the State and with particular reference to the localities that have availed themselves of State aid by appropriating sums for good roads work.

The members of the commission and its engineers will address county and town boards on the provisions of the law and on highway improvement in general.

The speakers will be: John A. Hazelwood, chairman; Senator John S. Donald, Senator E. E. Browne, A. R. Hirst, State highway engineer; M. W. Torkelson, bridge engineer, and W. C. Buetow, assistant bridge engineer. Each of the meetings will be made into a "Good Roads" rally and the entire scheme will be one of the greatest value from an educational standpoint that good roads workers in Wisconsin have ever experienced.

Milwaukee Is After Boy Drivers

MILWAUKEE, WIS., Nov. 6—To prohibit any person under 21 years of age from operating motor cars in the city of Milwaukee is the object of an ordinance now being framed by the Municipal administration for presentation to the common council. The proposition has aroused a storm of indignation and it is thought at this time that such a law will have slight changes for passage.

The object of the ordinance is claimed to be to curb "joy-riding" instincts of the young. It would also prohibit girls under 18 years of age from being in any motor car operated by any person under 21 years of age, unless they have the consent of parents or guardians.

Leading attorneys doubt the right of the municipality to legislate all persons under 21 from operating motor cars. It would be an encroachment upon the State law, which restricts the operation of motor vehicles to all persons over 16 years, excepting that a person 16 years or younger may drive when accompanied by parent or guardian.

Touring and Camping—The Ideal Vacation

The recent Summer season saw more people than ever before enjoying the delights of automobile touring. One of the most interesting which has come to our notice is that made by Mr. W. M. Leftwich, a prominent engineer of Nashville, Tenn. Mr. Leftwich decided to make his tour a "go-as-you-please" affair, not planning to reach a given point each night. In order to accomplish this he carried sleeping bags for the party of seven, and also included a compact cooking outfit. His big six-cylinder Locomobile afforded ample room for this equipment.

The route led from Nashville, Tenn., through Kentucky, Ohio, New York and New England, into Canada, which was entered twice on the trip, Quebec being the first place visited, and later on the party toured in quaint old Nova Scotia. The tour covered over 5,000 miles.

T. C. A. Scouts Arrive at Richmond

RICHMOND, VA., Nov. 6—The cars containing the good roads scouts of the Touring Club of America arrived in Richmond at 3 p. m. Saturday afternoon, having covered the entire distance of 725 miles since Tuesday morning at 11 o'clock. This trip was undertaken to lay out a practicable route for good roads enthusiasts who want to make the trip by auto from Atlanta to the first annual Road Congress of the American Association for Highway Improvement, which takes place at Richmond, November 22.

The cars used in making this trip were the Chalmers Six, which was an official press car for the Glidden Tour. This car was taken off the train Tuesday morning at 9 o'clock and was immediately put into service for the run without any repairs or attention other than filling up with oil and gasoline. The car reached Richmond in perfect condition and without any tire trouble whatever, although the roads were anything but smooth. In this car were Henry MacNair, editor of the *Blue Book*, pilot of the party; W. Douglas Gordon, Police Commissioner of Richmond and correspondent of the *Times-Dispatch;* Lee A. Folger, manager of the Gordon Motor Company, of Richmond, and W. A. Vibbert, official photographer, who was also on the Glidden Tour. The car was driven by Freeman Monroe, of the Chalmers factory in Detroit. The second car was a Mitchell Six, carrying Frederick H. Elliott, secretary of the Touring Club of America; D. D. Armstrong, vice-president and manager of the Southern department of the T. C. A., and H. B. Varner, editor of *Southern Good Roads*. The car was driven by Chas. T. Oley, of the Mitchell factory at Racine. Both the cars came through without any serious mishap, although the Mitchell was slightly delayed on the last day by tire trouble.

The party left Georgian Terrace at Atlanta on Tuesday morning at 11 o'clock and arrived in Augusta at 9:30 p. m.

In Augusta they were met by E. J. Watson, Commissioner of Agriculture of South Carolina, and party, who escorted the cars to Columbia the next day. Some of the road was very rough and the escort car broke a front axle in one of the chuckholes. At Columbia the party was met by many prominent citizens and was entertained at the Columbia and Metropolitan clubs. The next day's run was from Columbia to Pinehurst, a distance of 175 miles, nearly all of which is good sand-clay road.

At Pinehurst the party was met by Leonard Tufts, president of the Capital Highway Association, who entertained them royally and piloted them out of town next day over a new sand-clay road which is being constructed between Pinehurst and Fayetteville. Between Fayetteville and Raleigh the going was the worst of the trip, but Cumberland County has issued bonds for $200,000 which will be immediately used for building sand-clay roads. A luncheon stop was made at Raleigh and the party pushed on to Henderson, N. C., for the night stop.

At Henderson an early start was made Saturday morning and between Barley and Emporia, Va., the finest road was negotiated. This, as with all of the other good roads on the trip, was sand-clay costing about $500 a mile. The cars traveled along on this trip at forty miles an hour as comfortably as on the finest macadam boulevard. But beyond Emporia the going was very bad.

At Petersburg an escort party headed by W. T. Daloney met the cars. The road from Petersburg to Richmond is also sand-clay road and has been recently resurfaced so that the last 22 miles of the distance were made in 40 minutes. The tourists were loud in their praises of the hospitality and enthusiasm along the line. The consensus of opinion is that with very little work and a moderate sum of money the entire trip from Atlanta to Richmond can be made to compare with any similar trip in the Northern States.

The complete official program for the congress is as follows:

NATIONAL DAY, NOVEMBER 20.

Morning Session—Address by Governor William H. Mann, of Virginia; address of welcome by Hon. D. C. Richardson, Mayor of Richmond; opening address by Logan Waller Page, president of the American Association for Highway Improvements; address by William Howard Taft, president of the United States; address by W. W. Finley, president of the Southern Railway Company; address by Hon. J. Hampton Moore, of Philadelphia, president of the Atlantic Deeper Waterways Association.

Afternoon Session—Address by Hon. Thomas S. Martin and Hon. Claude A. Swanson, United States Senators from Virginia.

Evening—Smoker at the Jefferson Hotel, arranged by the Chamber of Commerce and the city of Richmond.

CONTRACTORS' DAY, NOVEMBER 21.

Harold Parker, chairman; chairman's address; address by W. A. McLean, Toronto, Canada; address by P. St. Julien Wilson, State Highway Commissioner of Virginia; address by J. B. Girand, territorial engineer of Arizona; address by W. W. Cosby, State Highway Engineer of Maryland; address by Arthur H. Blanchard, professor of highway engineering, Columbian University.

Afternoon—Addresses by D. L. Hough, president United Engineering and Contracting Company; Mr. Bates and other contractors. Discussion, "The Relation of the Road Contractor to the Engineer."

Evening—Reception in Governor's mansion to all delegates.

ROAD USERS' DAY, NOVEMBER 22.

Address of welcome on behalf of the automobilists of Virginia, Preston Belvin, president of the Virginia Automobile Association; addresses by Hugh Chalmers, Detroit; Sidney A. Gorham, Chicago; Matthew S. Rogers, secretary State of Connecticut, "What It Has Done for Good Roads"; Colonel Charles Clifton, of Buffalo; Davis Dancroft, Chicago; Henry Fairfax, Virginia; Edward Lazansky, secretary of State of New York.

ASSOCIATION DAY, NOVEMBER 23.

Dr. Joseph Hyde Pratt, State geologist of North Carolina, presiding. Address on the use of convict labor in road building by Dr. Pratt. Discussion opened by S. W. McCallie, State geologist of Georgia. Other discussions of this session will be participated in by Jesse Taylor, secretary of the Ohio Good Roads Federation; W. D. Brown, editor *Rural Free Delivery News;* Leslie T. McCleary, of New York, representing the Lincoln Memorial Association; Dudley Field Malone, of the National Highways Protective Society, of New York; representatives of automobile associations, national civic federations and representatives of farmers' and labor organizations.

The afternoon session will be devoted to the election of officers of the association, selection of place for next meeting and the transaction of other business.

President Taft to Be Guest of A. C. A.

President Taft will be the guest of honor at the annual banquet of the Automobile Club of America, which is to be held at the Waldorf-Astoria on December 20. Fully 1,500 club members and their guests are expected to be in attendance.

In addition to President Taft the invited guests will include Vice-president Sherman, the Secretaries of State, War, Navy, Treasury, Agriculture, Commerce and Labor and Interior; Postmaster-General, Attorney-General and the Solicitor-General.

Body Styles at the Berlin Show

ACCORDING to German contemporaries, the considerable extent to which professionally educated artists, who abound in Germany, have lent their services to automobile manufacturers and body builders during the past year is one feature in the recent industrial development which has left its mark most plainly on the vehicles exhibited at Berlin. The departures from current styles in body design and equipment are bold and numerous. Some of them are dashing; others only help out utilitarian purpose.

In a general way it is noticeable that design runs to long continuous lines with a somewhat studied avoidance of mouldings and corners. The Utermoehle firm has succeeded in producing a phaeton which can be converted into a limousine and yet presents none of the makeshift lines, from an artistic standpoint considered, which have heretofore always been characteristic of convertible types. The same vehicle is equipped with extra-seats which disappear invisibly in the back of the front seats when not wanted, a single lever movement sufficing to throw each of them in or out. A large number of closed cars are provided with frameless window panes of a new patented style, and specially suspended armchair seats, known as the Wildening *Schwebesitz* or floating seat, are a new article of luxury intercepting practically all vehicle movement arising from sudden starts, stops and road shocks. The Kellner firm, which has nothing to do with Paris firm of the same name, seems to shake new ideas out of its sleeves. Its open car bodies are equipped with an electric light, designated as a map-reading lamp but equally useful for reading newspapers in the open. and its interior upholstering of limousines, all in leather, including the ceiling, produces an entirely novel effect of elegance, largely because the firm seems to have developed a new technique in leather finish. And it is said to have spent large sums for its experiments in this departure. Hunting cars in natural wood finish and with very strongly curved surfaces also present a striking effect, while the Windhoff limousine in Prince Henry style, very pointed in front and rounded at the rear and mentioned as the "type of the future," seems somewhat fantastic.

The use of windshields for rear as well as front seats is observed in a number of vehicles.

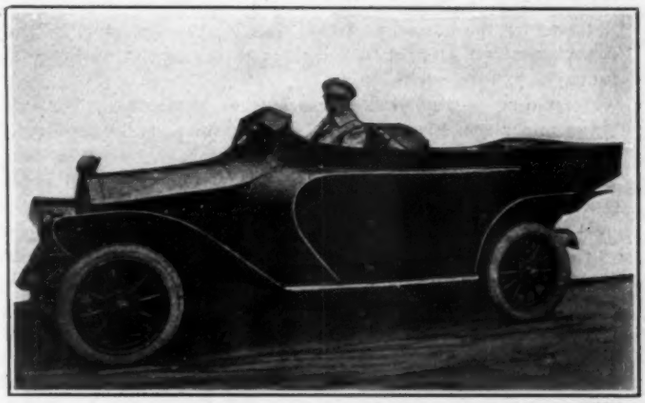
A modern demand for having all accessories disposed of inside of the carriage body accounts for the conspicuous novelty in the body design placed upon a Benz chassis by the Carl Toenjes firm of Delmenhorst. The lines are shown in the accompanying illustration copied from a half-tone in *Allgemeine Automobil Zeitung*. Even the travelling trunks are here protected against dust and grime and the spare tires rest on the running board inside of the side panel. The latter is not vertical but leans outward at the top. All the lines, particularly at the rear are designed with a view to reducing air resistance below that encountered in cars of customary design, and also to avoiding that formation of eddies which raises the dust of the road. In this instance the co-operation of a firm of artists —Ernst Neumann—is distinctly acknowledged, though the type is announced as only a first attempt to become the foundation for further efforts.

Impressions of an American Visitor.

BERLIN, Oct. 21.—One of the most striking features of the International Automobile Show from an American point of view is the entire absence of six-cylinder cars. Not a single German manufacturer is exhibiting a car of this type, and the only one that does exhibit such a car is the English Daimler, which has a beautiful six-cylinder chassis with Knight engine on exhibition. [A six-cylinder Protos car is also shown.—ED.]

Another very marked tendency is the bringing out of low-powered and low-priced models by many of the European manufacturers with the evident intention of preventing the capture of this class of trade by the American manufacturers who are now making a strong effort to secure the market for cheap cars. The only American cars exhibited are Ford, Mitchell, E-M-F and Flanders. The European manufacturers who exhibit cars of this class include Adler, Laurin and Klement, Stoewer and the French firm Clement-Bayard, and others. Each of the companies named exhibit four-cylinder cars ranging from $900 to $1,300 completely equipped. One of the best examples of this type is a very smart little four-seated torpedo by Laurin and Klement, listed at $1,275, and said to be capable of fifty miles an hour on the road.

A line of cars of striking originality in body design is very much in evidence. This is a type known as the Prince Henry, and is cigar-shaped. The hood is extended in a funnel-shaped manner to include the dash, which in many cases contains the gasoline tank, and this is so built into the dash as to be entirely out of the way, and the filler is in the centre on the front, so that it can be filled without disturbing any part of the



Side view of the all-enclosing carriage body placed upon a Benz chassis by the Delmenhorst Wagon Company

interior of the car; the filler is practically the same as the radiator cap. The body is long and narrow with only two seats in the rear with a handsomely upholstered arm rest between them, and in many models there are two folding seats, and the back of the front seats are in some cases upholstered in leather and in others are used as cupboards for carrying various articles that may be needed. The dash extends well back and flares up so as to help deflect the wind from the occupants of the front seats. The back of the front seats also have this same flare with the object of protecting the occupants of the rear seats. The general appearance of this type of body is pleasing, and it is rounded off at the rear so as to avoid as much as possible eddying currents of air which would otherwise tend to stir up dust.

The Minerva and Daimler exhibits of working models of the Knight engine with portions cut away to show the mechanism attract great attention and their stands are constantly crowded with visitors. The Minerva Company exhebits a 26-horsepower chassis with 1912 model engine with chain drive for pump and magneto, the latter having automatic advance ignition with only one lever on the steering wheel.

News of Shows—National and Local

SHOW announcements in New York were scarce again during the past week. The chief happening was the progress noted in the Palace show arrangements. As was chronicled at the time of the allotment of space to the Gramm and Kelly trucks in THE AUTOMOBILE, a protest was made giving those companies space on the second floor.

Mr. Gramm entered an informal objection to such an allotment and this week it has been announced that both the Gramm and Kelly vehicles will be shown on the main floor in conjunction with the pleasure automobiles.

It was the original intention of the National Association of Automobile Manufacturers to exhibit all the trucks on the main floor, around the other exhibits. This plan was later modified and the trucks were spaced in the second floor. As it is now, all the trucks except the Gramms and Kellys will be gathered on the second floor.

Accessory manufacturers sufficient to take up a large amount of space on the third floor have already been signed up and the prediction is made by officers of the association that all the space will be contracted for before the end of another week.

Show Arrangements in Quaker City

PHILADELPHIA, Nov. 6—Philadelphia's annual automobile show, again under the auspices of the Philadelphia Automobile Trade Association, will be held from Saturday, January 13, to Saturday, January 27, 1912, inclusive.

A building of sufficient proportions to house the entire exhibition under a single roof still being conspicuous by its absence, the same arrangements for accommodations as were in force last year will apply to this year's show, it being held simultaneously in two separate buildings, uptown in the First Regiment Armory, Broad and Callowhill streets, right in the heart of the automobile selling district, and downtown in the Third Regiment Armory, Broad and Wharton streets.

The first-named building during the initial week will be devoted to gasoline pleasure cars exclusively, the downtown structure to gasoline pleasure cars and accessories. For the second week the scene will be shifted at both armories—the gasoline cars uptown giving way to electrics and electrical devices, while downtown gasoline and electric commercial vehicles will hold the boards.

The Trade Association has appointed the following officers of the show: George W. Hipple, of the Chalmers-Hipple Motor Car Company, president of the Philadelphia Automobile Trade Association, to be chairman; Frank Eveland, manager of the A. G. Spalding branch, handling the Stevens-Duryea car, and J. A. Wister, of Gawthrop & Wister, agents for the Elmore and Brush. J. H. Beck will again manage the show for the fifth consecutive year.

Milwaukee Show Date Advanced One Week

MILWAUKEE, WIS., Nov. 6—The Milwaukee Automobile Dealers' Association has decided to hold its second annual motor show in the Auditorium beginning on January 13, and closing on January 19, instead of from Jan. 20 to 26, as previously announced.

More than 65,000 square feet of floor space will be used for the 1912 show, which is the fourth to be held in Milwaukee. The first two shows were given by the Milwaukee Automobile Club.

Only cars represented by Milwaukee county agencies will be permitted in the display, as last year, when 53 pleasure car makers and 17 commercial vehicle manufacturers were represented. Since last January, 29 additional pleasure cars have gained representation in the city and 14 more commercial car builders have been added to the list handled here.

Frank J. Edwards, manager of the Kissel Kar Co., has been appointed chairman of the show committee and Bart J. Ruddle will again act as general manager. The other members of the show committee are: Edgar Sanger, representing the Maxwell, Stearns and Columbia; Alfred Reeke, manager of the Milwaukee branch of the Thomas B. Jeffery Company; George W. Browne, distributor for the Overland and Marmon, and Robert G. Bates, agent for the Abbott-Detroit and White cars.

But One Show in Kansas City

KANSAS CITY, MO., Nov. 6—Kansas City is to have but one show this year. Last year, and the year before, owing to a disagreement among the dealers, two shows were given; but the antagonistic factions have agreed on the matters that were keeping them apart and one association has been formed, which includes all of the dealers in the city. The membership consists of more than sixty different companies, so that the coming show will be an immense one. It will take place in Convention Hall, which is the largest building for exhibition purposes in the West. Two balconies, in addition to the one already in the hall, will be necessary to accommodate all the dealers and the big accessory department.

Kansas City shows are always important events, owing to the fact that Kansas City is the gateway to the Great Southwest, a section in which more cars are sold annually than in any other locality of equal area in the United States.

The date of the show is the week of February 12th, 1912. There will be departments for gasoline pleasure cars, electric pleasure cars, commercial cars, motor cycles and accessories. The committee which will have charge of the show has established offices at 911 Floyd Building.

St. Louis Dealers Announce Show

ST. LOUIS, Nov. 6—A two-week automobile show is announced for St. Louis Feb. 5 to 17 at the Coliseum, by the same dealers who participated in the show held there last Winter. This will make the second exhibit to be given in St. Louis this season, an open air show having been successfully carried through early in October.

The coming exhibit, like those of Chicago and New York, will be divided into two parts. The first week will be devoted to the display of pleasure cars and accessories, and the second week to motor trucks. This will be the first time a two-week exhibit has been tried in St. Louis, and also will be the initial exclusive truck display.

Omaha's Show Ideas Expanding

OMAHA, Nov. 6—The annual meeting of the Omaha Automobile Show Dealer's Association was held last week. It was decided to hold the automobile show some time in the latter part of February. In previous years the show has been held at the auditorium and the dealers have been cramped for space. This year the association is planning to hold the show at the Coliseum, the home of the Knights of Ak-Sar-Ben of Omaha. The floor

space in the Coliseum is about double that of the other building, although it is not so centrally located. Twelve new members were admitted to the association.

The following officers were elected: J. J. Deright, president; J. T. Stewart, vice-president; Clark G. Powell, secretary and treasurer. The board of directors includes the officers and Guy L. Smith and Denise Barkalow. Mr. Powell will be manager of the show again.

Hoosiers to Hold a Fall Show

INDIANAPOLIS, IND.—Arrangements are being made by the Indianapolis Automobile Trade Association for a motor show to be held Nov. 20-25, the first Fall show Indianapolis has ever had. Fred I. Willis, who recently became identified with the Kokomo Rubber Co., Kokomo, has asked to be relieved of his duties as president of the association, and Harry A. Archey, first vice-president, is presiding over the club. It is probable that the association members, during the show, will furnish cars for a free 'bus service to carry visitors to and from the various salesrooms. Each dealer will exhibit in his own establishment. The association has adopted a resolution against the lending of cars for any purpose, charitable, or otherwise, unless the proposed lending is passed on favorably by the directors. Another resolution adopted provides that all requests for contributions or advertising for programs, or other things not directly identified with the motor car trade shall be referred to the association's secretary for recommendation.

Exhibition Planned for Baltimore

BALTIMORE, MD., Nov. 6—While no definite plans have been made, the Automobile Club of Maryland and the Baltimore Automobile Dealers' Association are working on the proposition and expect to announce show dates in the near future.

It is known that either the middle or latter part of February is favored, but those having charge of the affair in both associations do not care to decide on any definite date until they are sure that the time they select will not conflict with the shows in New York, Chicago, Philadelphia and other large cities. A general meeting of the Dealers' Association will be held in the near future.

Optimism in Industry at Detroit

DETROIT, MICH., Nov. 6—Following a most satisfactory October, November has come in full of promise for the local motor industry. Some of the manufacturers are already beginning to predict that 1912 will be the greatest year in the history of the business, in spite of the presidential election and the business disturbance that almost inevitably accompanies such an event.

Hugh Chalmers, president of the Chalmers Motor Company, in a talk before the men in attendance at the Chalmers technical convention last week, expressed the belief that 1912 would set a new record for sales of motor cars. For the first four months of the 1912 season the company's shipments show an increase of 35.3 per cent. over the same period last year. The factory is being operated up to its full capacity, working both day and night shifts.

The Chalmers technical convention will end this week. The attendance will not be confined to men from any one section, but service men from all parts of the country, who have not been able to come earlier, will take advantage of this opportunity to see just how Chalmers cars are made and to get into closer personal touch with the makers. The convention has been a great eye-opener for some of the visitors, and the company feels that the results achieved more than compensate for the monetary outlay.

The Ford Motor Company reports that it manufactured and sold nearly 4,000 cars during October. The output will be greatly increased, it is expected, when the new addition, now rapidly nearing completion, is put in operation early in December. The company is hopeful of breaking even the record of last May, when 6,013 cars were shipped, before the Winter is over.

That the other Detroit makers are sharing in this prosperity is shown by the extensive building operations under way. Mention has previously been made of several of the new plants and additions under construction, but of the building of motor car factories there seems to be no end, in this city at least. Work has been begun on a new garage for the Hupp Corporation at Jefferson avenue and Gilbert street, in the Fairview district, just two blocks from the company's plant. The building will be ready for occupancy about January 1. It will be used for displaying and storing R. C. H. cars. The garage will be 62 x 125 feet and will be a very ornamental structure.

A tract of land comprising 100 acres at Woodward avenue and the 9-mile road has just been purchased by Walter C. Piper, and it is understood that half of the property will be used as a site for a monster automobile plant, the remainder being subdivided into lots for the employees. It is not known, as yet, what company intends building here. The price paid for the land was about $85,000.

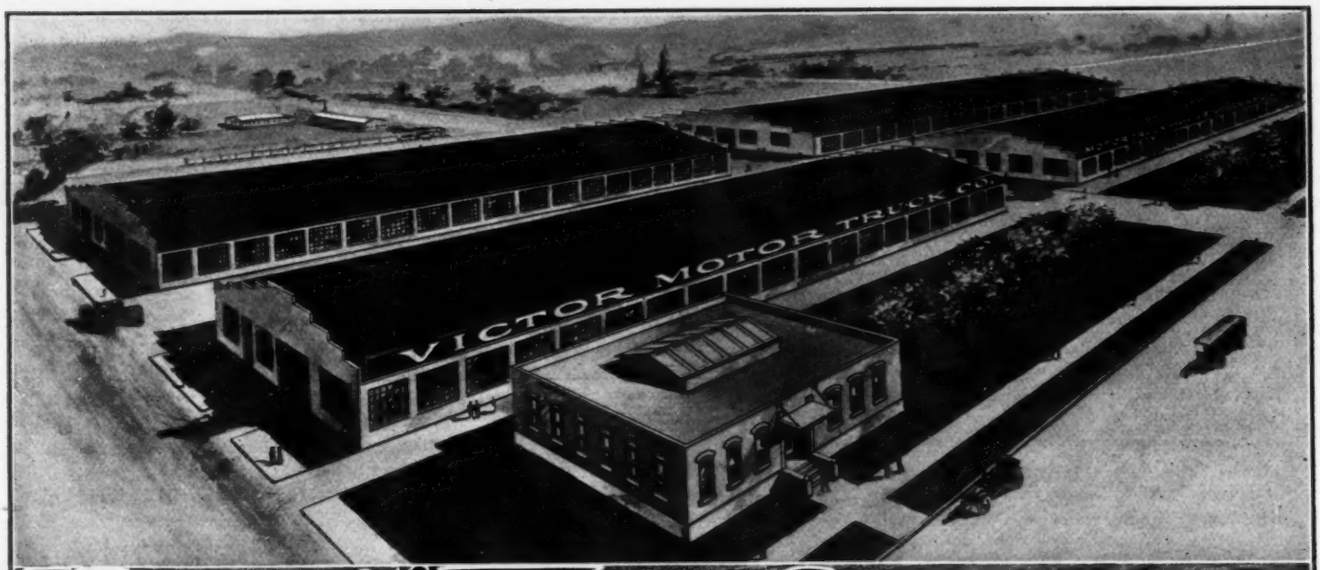
The Detroit Bi-Car Company has been organized with a capital of $100,000, to manufacture the "Bi-Car," which is described as a motorcycle embodying some of the features of an automobile. It is driven by a four-cylinder, four-cycle engine, started by a crank at the side. It has two speeds and a neutral, operated by a regular shaft drive. The company has established a temporary factory at Greenwood and Baltimore avenues, but plans to build later. The officers are: President, John J. Chapin, who is also the inventor of the machine; vice-president, Alfred Roseroot; secretary, John J. Berkery; treasurer, Frank J. Gorman.

The Wolverine Automobile Club is making arrangements for its third under-sealed-orders run next Sunday, the officials having mapped out the route yesterday. The trophy for this run will be donated by Robert K. Davis, of the United Motor Detroit Company. C. A. Smith, driving a Hupmobile, was the winner of the second run, a week ago. He came within 4 minutes of the official time, which was 6 hours and 39 minutes, an average of 13.28 miles per hour.

Atlanta Dealers Win a Home

ATLANTA, GA., Nov. 6—The Atlanta Automobile Dealers and Accessory Association has won itself a home. It accomplished this feat by amalgamating with the Transportation Club in a new organization which will be known as the Atlanta Auto-Transportation Club.

The full breadth of the scheme that the dealers' association is working on has not appeared in the newspapers yet, but it is planned within the year to absorb the Transportation Club entirely and to make a straight automobile dealers' club out of the affair. With Atlanta the center of the automobile business in the South the dealers have long felt the need of some place of their own where they could entertain guests, meet to transact business and thus preserve an active organization.



NEWS of the WEEK CONDENSED

BUFFALO, N. Y.—The new plant of the Victor Motor Truck Company is being built on a large plot of ground secured by the company on the Military Road and alongside the New York Central Railroad. The new building will possess all the advantages essential to efficient production of the various types of trucks made by the company. These include commercial trucks of from 1,500 pounds capacity to 10 tons capacity, and fire trucks of the combination hose wagon, pumping and hose and ladder and hose types.

BUENOS AYRES, S. A.—Prudencio Trejo has taken the agency for the Pullman cars.

BUFFALO, N. Y.—A. W. Meyer has taken the agency for the 1912 line of Pullman cars in Buffalo and northern New York.

LANSING, MICH. — The Olds Motor Works, of this city, has commenced to operate some of its departments thirteen hours a day.

KANSAS CITY, MO.—W. R. Griffin, of Stockton, Kas., has made arrangements with the Cole Motor Car Company, of this city, to handle the Cole 30-40.

PONTIAC, MICH.—With the final installment of machinery in the big A plant of the Flanders Manufacturing Company, the turning out of Flanders electrics will begin shortly.

GRAND RAPIDS, MICH.—Slootmaker Brothers will soon open their new garage on Madison square, at the head of Crawford street, where they are erecting a large cement building.

BOSTON, MASS.—Louis B. Adams, one of the best known newspaper men in New England, has just accepted a position with Harold D. Bornstein, of the Velie Boston branch, in the sales department.

FLINT, MICH.—The production of the 34 and 35 models of the Buick Motor Company for 1912 is steadily increasing. It is expected to increase the average daily output to fifty. The plant is now employing 3500 men.

PHILADELPHIA, PA.—The Pullman Automobile Company of Philadelphia has been formed by Pullman owners who will handle that line in the Quaker City and the surrounding territory, including part of New Jersey and Delaware. Harry Grant is president of the company.

SAN FRANCISCO, CAL.—The Flanders electric is to be handled in Northern California by the Pioneer Automobile Company, which also distributes the Chalmers cars. The company has also taken the agency for the R. C. H. car.

DENVER, COL.—J. A. Fry, for many years branch manager for Apperson Brothers in Chicago, and until recently connected with the Fry & McGill Auto Supply Company, of this city, has assumed the position of manager of the sales department for the Everitt branch in Denver.

FRESNO, CAL.—The San Francisco-Fresno record has been broken by a Warren "30" car, driven by Columbus Hobson of this city. The official time was 5 hours, 42 minutes and 30 seconds, the old record being 7 hours and 17 minutes, which had stood undisturbed for five years.

DENVER, COL.—The Goodyear Tire and Rubber Company has opened a handsome new store at 1562 Broadway. The furniture and fixtures are of white oak and an indirect lighting system makes a brilliant display at night. The branch now has four local and two traveling salesmen.

YORK, PA.—The Pullman Motor Car Company, of this city, announces that, in addition to its line of pleasure cars, it will build taxicabs in the future. The first taxicabs built by the company, a shipment of twenty-five, were sent to the Pullman Taxicab Company, of Philadelphia, last week.

DETROIT, MICH.—Marburg Brothers, importers of the Mea high-tension magneto and S. R. O. ball bearings, have opened a branch office in this city. Mr. Roy J. Taylor, well known in the automobile circles of this vicinity through his connection with manufacturers here, has been appointed manager.

HARVEY, ILL.—The Buda Company has arranged with Brandenburg & Company, located at 1108 South Michigan avenue, Chicago, Ill.; Fifty-seventh street and Broadway, New York City, N. Y., and Ford Building, Detroit, Mich., to sell their products, consisting of motors, transmissions and other parts for automobiles.

EMPIRE, ORE.—Mr. and Mrs. Ralph Barker have successfully completed their strenuous Coast-to-Coast run in their light delivery Reo motor truck. A few months ago Mr. and Mrs. Barker went by train from Empire to their old home in New England, and while there purchased the truck for their return trip. They left Stratham, N. H., August 10, provided with a touring cover forming a regular living room. With this was included a complete camping outfit, which permitted them to pitch their tent whenever and wherever they pleased.

CRIPPLE CREEK, COL.—The Cripple Creek Automobile Company has recently opened a new garage at 140 East Bennett avenue.

COLUMBUS, OHIO—Frank J. Girard, 174 North Fourth street, Columbus, Ohio, has taken the agency for the R. C. H. in 20 counties in central Ohio.

CLEVELAND, OHIO—F. H. Meyers, for many years in the employ of the Standard Welding Company, has been appointed to the office of assistant superintendent.

MILWAUKEE, WIS.—The Gas Power Engineering Company, Third and Wright streets, Milwaukee, has been appointed distributor for the Premier car. The company operates a large garage.

ELMIRA, N. Y.—Incorporation papers for the Elmira Automobile Club have been filed in the County Clerk's office. Incorporators, M. Doyle Marks, Arthur Clinton, Frank E. Robbins, Melvin R. Elis and others.

COLUMBUS, OHIO—The Hudson Sales Company, North Fourth street, Columbus, Ohio, has taken the agency for the Buick for 1912 in Franklin and Licking counties, Ohio. A sub-agency will be established at Newark, Ohio.

COLUMBUS, OHIO—The Cummins Auto Sales Company of 153 North Fourth street, Columbus, Ohio, has taken the central Ohio agency for the K-R-I-T for 1912. The territory includes six counties in the central part of the state.

WASHINGTON, D. C.—A change has been made in the Lozier agency here and the 1912 line of cars will, in the future, be handled by the Lozier Sales Company, of 1315 H street, N. W., this company having been formed exclusively for the purpose.

SAN FRANCISCO, CAL.—The Stanley Steam Car Company has been organized to handle the well-known steam car of that name in Northern California. L. H. Austin and R. C. Bennett, prominent Bakersfield men, are the organizers of the company.

DETROIT, MICH.—J. R. Hall, for five years manager of the Service Department of the eastern district branch of the Lozier Motor Company in New York City, has been appointed to the position of manager of the Service Department of the Lozier Motor Company in this city.

MILWAUKEE, WIS.—The City of Milwaukee, which owns sixteen motor cars, is considering the purchase of six more. Three will be for the use of assistant chiefs of the fire department, two for the health department and one for the consolidated police and fire alarm signal service.

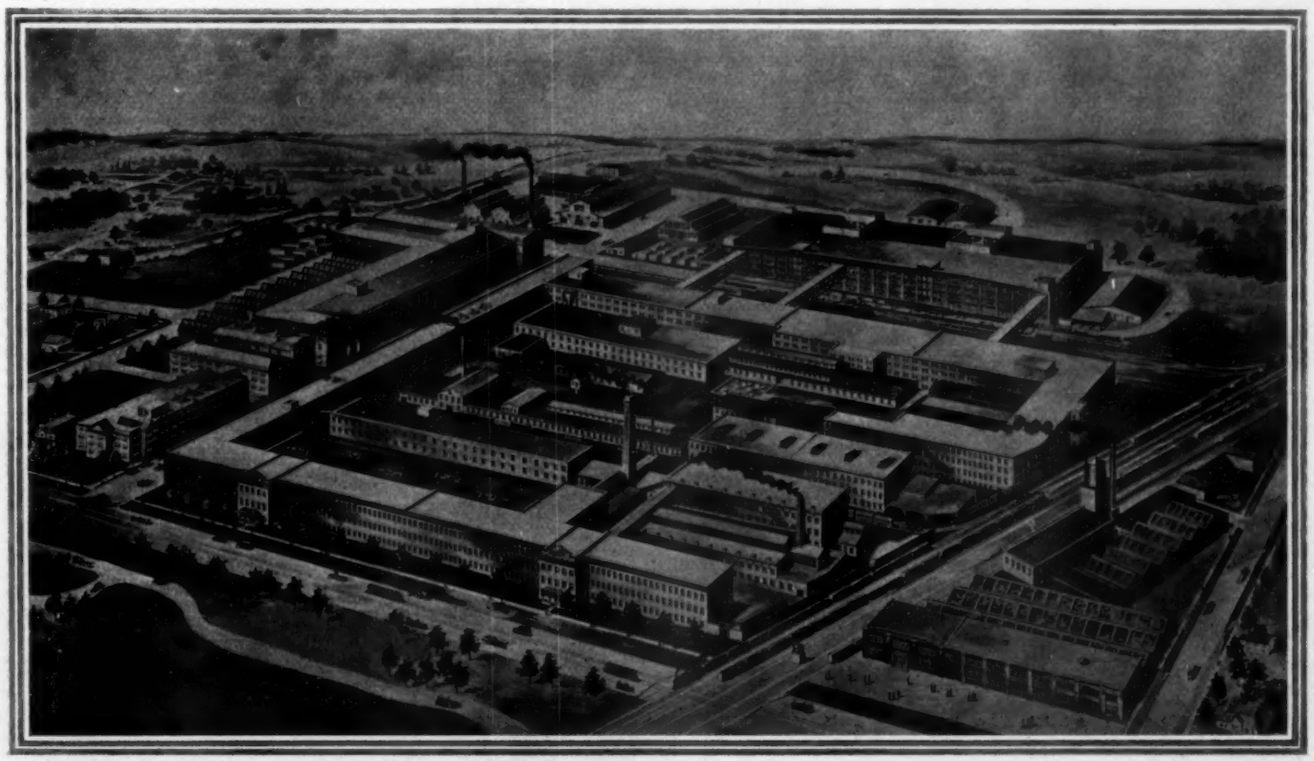
PHILADELPHIA—The Mercer Automobile Company, of Trenton, N. J., has taken the distribution of its cars out of the hands of agents and in future it will be conducted through a branch house which has just been established at 620 North Broad street. W. A. Smith, formerly business and advertising manager of *Automobile Topics*, has been placed in charge as branch manager.

AKRON, OHIO—In a decision handed down recently the circuit court sustained the common pleas court in finding Earl Sprankle of Akron, Ohio, guilty of manslaughter in running down and killing Helen Starr with an automobile which Sprankle was driving. Sprankle was found guilty in the criminal court and sentenced to the Mansfield Reformatory. The case may be carried to the Supreme Court.

INDIANAPOLIS, IND.—The formal opening of the bus service of the Rapid Motor Transit Company in Indianapolis took place on November 1. There are seven cars, six of which are in continual service from 6.30 A. M. to 11.15 P. M. daily, while the seventh is used during the rush hours. Entrance is at the front of the right hand side and the pay-as-you-enter system is employed, the driver collecting fares as passengers enter.

INDIANAPOLIS, IND.—A number of changes have taken place in the local trade. The Case factory sales branch has been moved from North Capitol avenue to 241 Kentucky avenue. A. W. Ellis, city salesman for the Goodyear tire sales branch, has become manager of the Louisville branch. Frank Staley has become Indiana distributor for the R. C. H., with headquarters at 513 North Capitol avenue. A factory sales branch of the Schact Motor Car Co., Cincinnati, O., has been opened at 328-330 North Delaware street.

LOS ANGELES, CAL.—The Alfred C. Stewart Machine Works has disposed of its United States rights to the Detroit Lubricator Company, of Detroit, Mich., which company will be turning out the Stewart Carbureter within the next two or three months.



Bird's-eye view of the enlarged Willys-Overland plant at Toledo, Ohio—new body-building, trimming and paint department building in background

Three-ton Packard truck used in farm work in Connecticut

CLEVELAND, OHIO—The Lozier Motor Company has moved into its new quarters at 6402-4 Euclid avenue.

OMAHA, NEB.—J. A. Longyear, of South Bend, Ind., has recently joined the retail sales force of the Omaha branch of the E-M-F Company.

BOSTON, MASS.—The Malley Motor Vehicle Company, agent for the Warren car, is to handle the Flanders Electric in Boston and vicinity.

BALTIMORE, MD.—The Oakland Sales Company, representatives of the Oakland car and Federal truck in this city, has moved to its new quarters on East Chase street.

SAN FRANCISCO, CAL.—The Pioneer Automobile Company has taken the agency for the Flanders Electric car. R. H. Morris will be in charge of the company's electrical department.

BOSTON, MASS.—F. L. Sanford has joined the sales force of the Henley-Kimball company and has been given charge of the wholesale department for outside territory on Hudson cars.

NEW YORK CITY—The Mitchell-Lewis Motor Company, of Racine, Wis., has opened a branch house at 1855 Broadway and a new service building on Fifty-first street, west of Broadway.

SYRACUSE, N. Y.—I. W. Reid has resigned as comptroller of the Franklin Automobile Company. His plans for the future are undecided. B. E. Snyder, head accountant, has assumed Mr. Reid's duties.

BOSTON, MASS.—The new Alco branch is now located in Copley Square with George M. Hudson as manager and has leased quarters in the big Shoe & Leather building in Cambridge for a service department.

MONTREAL, CAN.—The Canada Auto & Taxi Company, of this city, announces that, to comply with the ever-increasing demand for taxicabs, they have decided to reduce their fares by one-half during business hours.

CLINTON, ONT.—The town of Clinton voted to-day to sell a partly equipped plant and to give a fixed assessment to the Clinton Motor Car Company, which consists of Toronto capitalists and local manufacturers.

BOSTON, MASS.—The Selden car and the Mais truck, formerly handled in this city by W. S. Jameson on Boylston street, are now being marketed by R. L. & H. L. Smith & Company with offices at 1008 Commonwealth avenue.

BOSTON, MASS.—The J. W. Maguire Company, agent for the Pierce Arrow car in eastern Massachusetts, has secured a lease of the premises next door to its present site, giving it one of the largest salesrooms on Boylston street.

NEW YORK CITY—The various articles of automobile clothing used in connection with the illustrations for "Comfort in Winter Driving," in our issue of November 2, were from the establishment of the Auto Supply Company, 1789 Broadway, New York City.

SYRACUSE, N. Y.—The Franklin Automobile Company's local business will be handled hereafter at the factory in South Geddes street. More ample display facilities are afforded, while the repair work can be better handled in the factory repair department.

UTICA, N. Y.—The Oneida Garage Company will soon erect one of the finest garages in this section of the State at 215 Park avenue. The officers of the company are Frank Bowen, president; H. T. Powell, secretary and treasurer, and George A. McCracken, general manager.

DETROIT, MICH.—Hal Reifenberg, manager of the Warner Instrument Company's branch house at Kansas City, Mo., has been put in charge of the company's branch house in this city, succeeding A. S. Koto, who has resigned. Mr. Reifenberg's successor has not yet been announced.

LOUISVILLE, KY.—Arthur W. Ellis, of Indianapolis, is the new manager of the local branch of the Goodyear Tire & Rubber Company. He succeeds Robert B. Harbison who has resigned. James B. Williams, of Harrodsburg, has been chosen to fill the position of office manager, formerly held by Robert Grabill.

CLEVELAND, OHIO—Mr. Frank L. Sessions has been appointed to the office of superintendent of the Standard Welding Company. Mr. Sessions is a graduate of Worcester Polytechnic Institute, 1889, a member of the American Society of Mechanical Engineers and of the American Society of Electrical Engineers.

FRESNO, CAL.—The Warren-Detroit car, which won the silver cup in the recent endurance run from San Francisco to Los Angeles and return, also broke the road record between San Francisco and Fresno. The official time was 5 hours, 42 minutes and 30 seconds, the former record was 7 hours and 17 minutes.

NEW YORK CITY—J. R. Hall, for five years manager of the service department of the Eastern district branch of the Lozier Motor Company here, has been appointed manager of the service department of the Lozier Motor Company of Detroit, Mich. Mr. Hall has been identified with the Lozier interests for more than twenty years.

ATLANTA, GA.—So vigorous has been the competition for desirable situations for automobile agencies in Atlanta that they are becoming hard to find. The Locomobile Company of America has not as yet been able to locate its Atlanta Branch and is still occupying desk room at 230 Peachtree street. The company will soon open its own place.

INDIANAPOLIS, IND.—Kark Feilcke, chief designer and engineer of the Motor Car Manufacturing Company of this city, sailed from New York last week to attend the Olympia show in London, thence proceeding to the Continent, where he will investigate any new ideas of the European manufacturers. He will return early in January to attend the New York show.

GREENWICH, CONN.—Conyers Farm covers 1,600 acres in this State and a small tract in New York State. It is famous for its apples, of which this year's harvest totaled 3,500 barrels. The work about the farm is so heavy and continuous that a 3-ton Packard truck is in constant use doing the heavy hauling. Much of the work of the truck consists in transporting the farm products to this place, fully 7 miles distant. During portions of the year the truck is kept in constant service for 20 hours out of the 24, and it has been proven time and again that it can make three trips while the horse-drawn teams used on the farm are making one.

WASHINGTON, D. C.—Colonel George Schutt has returned from a 4,500-mile trip to Omaha, Neb.

MILWAUKEE, WIS.—The Spring Bearing Truck Company has increased its capital stock from $10,000 to $20,000 to care for extensions of the business.

HAZLETON, B. C.—After a gruelling trip, replete with adventure, the Flanders Pacific Highway pathfinder successfully completed the rail-blazing run from Seattle, Wash., to this city.

BERLIN, GERMANY—Because cattle do not mind a little noise like the tooting of an automobile horn a German manufacturer has added folding whips to the equipment of his cars.

INDIANAPOLIS, IND.—Charles Lacy, of Buffalo, has taken charge of the repair shop at the local branch of the Buick Motor Company. Mr. Lacy has had great experience in automobile repair work in the East.

WASHINGTON, D. C.—The Lozier Sales Company has been formed to handle the Lozier here. W. M. Giesey, formerly of Pittsburg, will be the manager. The salesroom has been located at 1315 H street, N. W.

WASHINGTON, D. C.—The Pope Automobile Company, agent for the Pope-Hartford and the Columbus Electric, has been appointed agent for the Marathon in the District of Columbia, Maryland, Virginia and West Virginia.

WASHINGTON, D. C.—Miller Brothers, one of the oldest motor cars firms here, and who have handled the Ford and Velie for a number of years, have relinquished the agency for the latter make. Several firms are negotiating for the Velie agency.

RICHMOND, VA.—The Virginia Taxicab Service Company, of this city, has instituted suit for damages to the sum of $45,000 in the Law and Equity Court against the Sultan Motor Company and the Otis Elevator Company. No declarations have as yet been filed.

SAN FRANCISCO, CAL.—Two new automobile agencies have invaded San Francisco the past week, the Bergdoll and Colby machines. Ben R. Savanah has the agency for Northern California on these two new cars and will shortly appoint sub-agents throughout the interior of California.

MILWAUKEE, WIS.—The Milwaukee and Wisconsin agency for the Packard, held by Welch Brothers Motor Car Company, has been supplanted by a direct factory branch which will be located in the present Packard garage. O. G. Heffinger, sales manager for the Welch Brothers company, becomes general manager, and the technical management continues in the hands of H. W. Liddle. R. C. Chidester will be sales manager.

STEVENS POINT, WIS.—The Central Wisconsin Motor Show was held here by the Auto Sales Company to celebrate the opening of its large garage. The company handles the Cadillac, E-M-F, Flanders Buick, Stoddard-Dayton, Overland and Rambler. Dr. J. W. Bischoff, a well-known physician and one of the earliest motorists of the State, is at the head of the concern. The Mayor and other notables made addresses each night.

Automobile Incorporations

AUTOMOBILES AND PARTS

BOSTON, MASS.—Vera Motor Car Co.; capital, $60,000; to manufacture automobiles. Incorporators: G. M. Polani, A. M. Sweeney.

BRADFORD, PA.—Bradford Auto Exchange; to make automobiles and parts. Incorporators: F. H. Reed, J. I. Holmes, F. H. Deagan, S. L. Tibbitts, F. D. Gallop.

BUFFALO, N. Y.—International Automobile League Tire & Rubber Co.; capital, $1,000,000; to manufacture tire casings and inner tubes.

BROOKLYN, N. Y.—Finlay Automobile Co.; capital, $10,000; to sell automobiles. Incorporators: William Finlay, Joseph School, Ernest Finlay.

DETROIT, MICH.—Detroit Bi-Car Co.; capital, $100,000; to manufacture automobiles. Incorporators John J. Chapin, Alfred Roseroot, John J. Berkery, Frank J. Gorman.

EVANSVILLE, IND.—F. W. McNeely & Co.; capital, $25,000; to deal in automobiles. Incorporators: Chester Rankin, F. W. McNeely, Alice McNeely.

ERIE, PA.—Stirling Brothers Co.; capital, $15,000; to sell automobiles. Incorporators: Alex Stirling, John Stirling.

FREDERICKSBURG, VA.—Fredericksburg Motor Co., Inc.; capital, $10,000; to conduct a general automobile business. Incorporators: L. R. Colbert, Alvin T. Embrey, H. C. Biscoe.

KNOXVILLE, TENN.—Stewart Automobile Co.; to deal in motor cars. Incorporators: R. G. Stewart, E. F. Ferry, L. Lemay, Mrs. S. Stewart, Mrs. Nellie Blankenship.

NEW CASTLE, IND.—Whitesides Commercial Car Co.; capital, $31,250; to manufacture freight automobiles and parts. Incorporators: F. N. Whitesides, O. S. Saffert, O. O. Carpenter.

NEW YORK CITY.—Hatch Oil Engine Co.; capital, $100,000; to manufacture engines and machinery. Incorporators: C. W. Hatch, W. P. Hatch, Jr., A. Anderson.

NEW YORK CITY.—International Motor Service Association; capital, $100,000; to manufacture automobiles. Incorporators: Wm. H. Brearley, Walter W. Friend, Irene A. Monsees.

PORTLAND, ME.—Hamlin-Foster Co.; capital, $100,000; to manufacture automobiles. Incorporators: Arthur D. Hamlin, Albert S. Ventrea, Charles C. Briggs.

RIDGE, N. J.—Stark Auto Co.; capital, $10,000; to deal in automobiles. Incorporators: Jacob H. Stark, Harry S. Stark, Robert A. Sibbald, Frank O. Mittag.

SANDUSKY, OHIO.—Sandusky Auto Parts Co.; increased capital stock to $500,000.

WILMINGTON, DEL.—Eastman Motor Truck Co.; $25,000; to manufacture freight automobiles. Incorporators: J. H. Sheidis, C. E. Semmes, H. G. Eastburn.

WOODSTOCK, ONT.—Woodstock Automobile Mfg. Co., Ltd.; capital, $50,000; to build automobiles. Incorporators: Alexander C. Applebaum, Herbert H. Thorpe, H. F. Greene.

AUTOMOBILE GARAGES AND ACCESSORIES

AKRON, OHIO.—Diagonal Block Tire Co.; capital, $25,000; to make automobile and motorcycle tires and other rubber goods. Incorporators: J. A. Swinehart, W. R. Talbot, Frank R. Talbot, A. L. Siegrist, W. H. Graham.

BROOKLYN, N. Y.—Agotaras Garage Co.; capital, $10,000; to sell, repair and store motor vehicles. Incorporators: Wm. R. Hoffman, Leonora Klinger, John Bahr.

BUFFALO, N. Y.—Frontier Tire & Rubber Co.; capital, $250,000; to manufacture pneumatic tires. Incorporators: George B. North, Howard N. Gill, Franklin D. L. Stowe.

CLEVELAND, OHIO.—Cleveland Welding & Mfg. Co.; capital, $150,000; to manufacture rims and other welded products. Incorporators: E. I. Heinesohn and others.

CHICAGO, ILL.—General Auto & Repairing Co.; capital, $25,000; to conduct a general garage and taxicab business. Incorporators: W. R. Potter, George H. Davis, Frank H. T. Potter.

NEW ORLEANS, LA.—Hercules Tire Co.; capital, $50,000; to manufacture tires and rubber goods. Incorporators: J. M. Underwood, Sam J. Connell and others.

NEW YORK CITY.—City Taxicab Co.; capital, $10.000; to conduct a taxicab business. Incorporators: Arthur J. Smith, Wm. Oakford, F. M. Oakford.

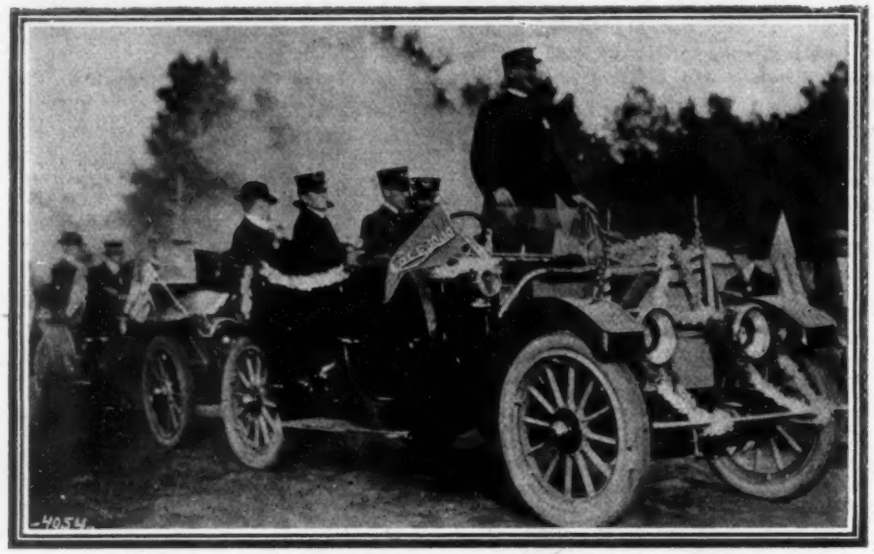
NEW YORK CITY.—G. & Accessory Co.; capital, $100,000; to make and sell automobile supplies. Incorporators: F. D. Glover, J. G. Stuart, J. Z. Lowe, Jr.

NEW YORK CITY.—The Service, Inc.; capital, $100,000; to conduct a general agency relative to automobile trade, collections, etc. Incorporators: D. M. Hooks, T. B. Nisbet, F. C. Carr.

NEW YORK CITY.—Teven Garage Co.; capital, $10,000; to conduct a garage business. Incorporators: Joseph C. Graveur, Martha Graveur, Ross Teven.

Ending of the parade in honor of the Maxwell Glidden winner, at the United States Motor Company building, New York City

OF INTEREST to the INDUSTRY



Atlanta police with their new Cole service car meet Gliddenites

ATLANTA, GA.—The police of Fulton County, in which this city is located, have long felt the need of an automobile in their work. Two weeks ago a 1912 Cole 30-40 car was purchased for them and, by a happy coincidence, the first duty it was called upon to perform was to meet the incoming Glidden Tour and guide it into and through Atlanta.

AKRON, OHIO.—A. G. Partridge has been appointed assistant sales manager of the Firestone Tire & Rubber Company.

FORT WAYNE, IND.—At the annual meeting of the stockholders of the Ideal Auto Company it was unanimously voted to increase the capital stock from $50,000 to $100,000.

PITTSBURG, PA.—Reports received here from the capitals of many States show that in two years the number of women drivers of automobiles have increased more than three times over.

COLUMBUS, OHIO.—The contract has been awarded for a large addition to the plant of the John W. Brown Manufacturing Company of Columbus, Ohio, makers of automobile lamps and other accessories.

SUMTER, S. C.—L. A. Prince, of the Ohio Motor Car Company, of Cincinnati, Ohio, has taken the managership of the Ohio Sales Company of South Carolina. He will operate a vulcanizing plant in connection with this.

RIO DE JANEIRO, BRAZIL—More than a dozen large manufacturers of American motor cars have sent representatives with demonstrating machines to this city in the past month to take advantage of the great boom in the automobile industry.

MILWAUKEE, WIS.—David Van Alstyne, vice-president in charge of the manufacturing department of the Allis-Chalmers Company, has sent in his resignation, to take effect November 15. C. E. Search, formerly Mr. Van Alstyne's assistant, has been appointed works manager.

BIRMINGHAM, ALA.—The H. W. Johns-Manville Company have found it necessary, owing to increasing business, to change the location of their office from 1220 Empire Building to 606 Chamber of Commerce Building. The office will continue under the management of W. H. Fleming.

NEW YORK CITY—The balance of trade in motor cars continues to grow in favor of the United States. Besides the gain in exports, in the first eight months of 1911 there were imported 608 cars valued at $1,312,969, against 723 cars valued at $1,443,871 in the corresponding period of the preceding year.

COLUMBUS, OHIO.—T. A. Sawyer has purchased the business of the Monnett Brass Company, located at 62 1-2 East Spring street, Columbus, Ohio, and has changed the name to that of the Sawyer Auto Brass & Specialty Company. The concern will continue the business of making accessories and parts for motor cars.

INDIANAPOLIS, IND.—Directors of the Whitesides Commercial Car Co., recently reorganized, and which is moving from Franklin, Ind., to Newcastle, Ind., have elected the following officers: President, O. W. Saffell; vice-president, F. M. Whitesides; secretary and general manager, C. W. Boyd, and treasurer and factory manager, J. W. Prigg.

MUNCIE, IND.—Thomas J. Heller, formerly sales manager of the Standard Roller Bearing Company, has joined the forces of the Warner Gear Company as Eastern factory representative, with headquarters at Glenwood avenue and Second street, Philadelphia. Mr. Heller will handle the Eastern sales end of the company, whose product comprises pleasure and commercial car transmissions, steering gears, control levers, clutches and differentials. Mr. Heller is well known to the automobile trade.

DETROIT, MICH.—The Lavinge steering gear, formerly manufactured by the Lavinge Mfg. Co., has been taken over into a new corporation, known as the Lavinge Gear Co. The new company has been organized with a capital of $100,000, with offices at Detroit and Milwaukee. In addition to the Detroit plant, they will operate a larger plant for the manufacture of the steering gear exclusively at Corliss, Wis., a suburb of Milwaukee. Joseph P. Lavinge, inventor and designer of the steering gear, will remain with the company as chief engineer.

NEW YORK CITY—Montgomery Hallowell, general advertising manager of the United States Motor Company, has resigned to join the forces of the H. E. Lesan Advertising Agency, where he will assist in the handling of the United States Motor Company advertising and in the broadening work of the Lesan Agency, a work for which, by long experience, he is eminently qualified. Gridley Adams has been appointed to succeed him. Mr. Adams has been advertising manager of the Stoddard-Dayton division of the United States Motor Company and is well known in the advertising field.

COLUMBUS, OHIO—The Union Sales Company of Columbus, Ohio, is backing the organization of what will be styled the Union Motor Car Company, which will manufacture a new line of motor cars to be known as the Union "25." The work of manufacturing has been started at the plant of the Dunlap Engineering Company, 1436 Parsons avenue. J. W. O'Brien, of Nashville, Tenn., who is at the head of the Union Sales Company, announces that contracts have been signed for 5,000 parts and it is proposed to build at least 200 cars during the coming season. Only one model will be made and that will be a two-seated runabout which will sell for $650 or $700, equipped with windshield, lamps, speedometer, top, generator and trunk. The offices of the company are located at 61 East Spring street and the marketing of the product will be done by the Union Sales Company.

PATENTS GONE TO ISSUE

INTERNAL COMBUSTION ENGINE—In which flow of gases is regulated by an oscillating valve.

3. The patent (Fig. 1) covers the combination with a cylinder having an inlet and an exhaust port, of an oscillating valve pivoted therein at one end of its body portion, controlling both the exhaust and inlet ports, and means for producing oscillation of said valve.

No. 1,007,491—To Robert A. Reynolds, Detroit, Mich. Granted October 31, 1911; filed March 15, 1909.

ROTARY ENGINE—Combining the principles of cylinder and rotary piston.

5. This engine contains a cylinder in which operates a rotary piston. In the latter is slidably mounted a device which has diametrically opposite blades. An abutment is slidably mounted in a cylinder and co-acts with the piston, it being urged inwardly by a spring. A cam projects into the cylinder and is disposed in the path of the blades, causing one blade to move inwardly and the opposite blade to move outwardly. Means are provided for conveying a charge into the cylinder on one side of the abutment, while on its opposite side means for igniting are located. As the blade passes and pushes the abument outwardly a charge may be admitted into the cylinder under pressure.

No. 1,007,100—Bert H. Harris, Goldhill, Oregon. Granted October 31, 1911; filed May 6, 1910.

ACETYLENE LAMP—A combination of acetylene generator and light.

1. This patent (Fig. 2) refers to the combination of an acetylene lamp with a carbide reservoir having a cap on which is mounted a water receptacle, with a burner extending from the cap and a block of fibrous material covering the inner end of the burner. To the under side of a metallic plate is secured a section of cork adapted to close the opening of the carbide reservoir with the plate resting upon the edge of the reservoir opening. Cork and plate have a number of conical openings for the passage of gas from the reservoir to the acetylene burner, fibrous material being loosely packed in the openings.

No. 1,007,374—To Anton H. Mollman, Jr., Hillsboro, Ill. Granted October 31, 1911; filed December 31, 1910.

CLUTCH—Containing in its make-up a bearing and races.

5. In this clutch (Fig. 3) a bearing race with revoluble bearing members is interposed between the driving and the driven members, wedging members being adapted to be projected against the bearing members to wedge the same in their race. A ball is mounted over each of the wedging members and axially movable clutch members are provided which, when moved together, exert pressure on the balls, whereby the wedging members operate to wedge the revoluble bearing membrs in their race.

No. 1,007,139—To Bertram H. Penn, London, England. Granted October 31, 1911; filed October 8, 1910.

CARBURETER—Spreader members are used to obtain good mixing effect.

3. This carbureter (Fig. 4) comprises a casing with an inlet of the bottom and an outlet at the top. To control the outflow of mixture from the casing a throttle is provided and a supply connection extends to the casing and is provided with a valve seat and spreader member. With the valve seat co-operates a valve member to which is connected a movable spreader member co-operating with the fixed spreader member. Thus an annular outlet is formed between the two members and means are provided for yieldingly supporting the valve member and the movable spreader so as to allow the same to be opened by the suction through the casing. The opening movement of the valve is limited. Means are provided to operate the throttle and at the same time limit the movement of the valve, thereby allowing increased opening of both valve and throttle.

No. 1,007,659—To Merrill B. Rice, Los Angeles, Cal. Granted October 31, 1911; filed October 25, 1910.

VEHICLE TIRE—A pneumatic tire in which the rubber canvas body is reinforced by an armor fabric.

The tire protected by this patent comprises a casing, a reinforcing for this casing, including a canvas fabric body suitably disposed and incorporated within the casing, an armor fabric imbedded in the casing and extending into the heel portions of the same and disposed above the reinforcement mentioned. Hooked portions are formed on the termination of the side portions of the armor fabric, and a second armor is embedded and vulcanized in the tire casing and disposed above the first armor fabric, the second armor being V-shaped in cross-section with inclined sides formed thereby to ward off any sharp point which might pierce the casing, and hooked portions formed at the termination of the sides to securely anchor the second armor.

No. 1,007,018—To Harry Wilson and Carl Guder, McKeesport, Pa. Granted October 24, 1911; filed July 12, 1911.

PIPE JOINT—Being of a universal ball-and-socket type.

This joint compromises two tubular sockets, one of which fits into the other. Into the center of axis of one socket a hub is mounted, and co-axial with it another hub in the other socket. One of the hubs carries a bolt secured against longitudinal displacement in the hub. The bolt has a head and around it is fitted a sleeve which bears with a spherical edge against a spherical depression of the hub carrying the bolt. The sleeve has a spherical depression for the bolt head to rest upon and is connected to hub not carrying the bolt.

No. 1,007,362—By Johann Koenig, Riga, Russia. Granted October 31, 1911; filed May 27, 1911.

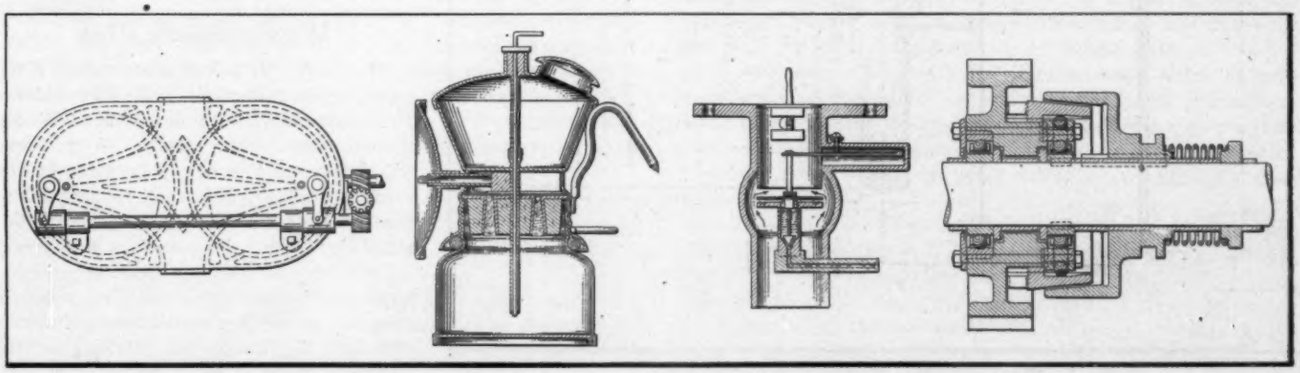


Fig. 1—Reynolds motor. Fig. 2—Mollman acetylene light. Fig. 3—Penn clutch. Fig. 4—Rice carbureter

Newest Ideas Among the Accessories

Start-Lite Illumination

THE system of lighting a car which is illustrated in Fig. 3 is made so as to relieve the driver of all trouble in lighting the lamps. It is made by the Start-Lite Company, of 1502 Michigan avenue, Chicago, Ill. In this system gas

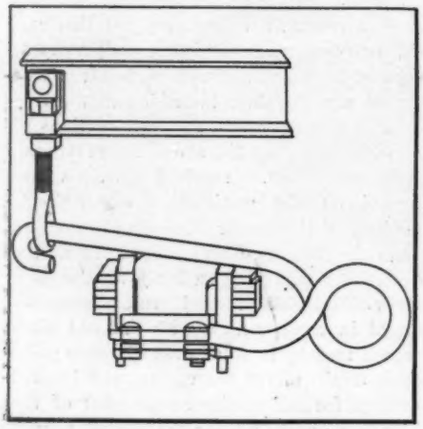


Fig. 1—View of the Ideal Shock Absorber

is led through suitable connections and piping to all the lamps and lights on the automobile. The control mechanism for the entire system is installed on the dash of the car, and gas may be admitted to one lamp or all of them at a time, according to the desire of the operator. On the same controller is also installed a switch for each headlight, sidelight and taillamp, and by switching on the current, a spark is produced in the gap of the sparker located above the burner of the respective lamp. The figure brings out clearly all the details of the wiring and piping systems serving the purpose of illumination on the automobile, and the installation of the system is simple enough to be undertaken by any mechanic. All the acetylene is taken from one tank, and all the current required comes from a battery, both being preferably installed upon the running boards of the car.

Ideal Shock Absorber

The Ideal type of shock absorber, Figs. 1 and 2, consists of two elements, as may be seen in Fig. 1. One is a steel loop attached to the chassis frame by means of a bolt and nuts, while the other is a one-piece oil-tempered-steel spring, which is coiled at its middle portion and bent to form a hook at one end. This hook engages the loop aforementioned, while the other end, which is only half as far from the spring coil, is securely fixed to the axle of the car.

In its normal state the shock absorber is in the position shown by the full lines in Fig. 2. Here the two arms of the absorber spring are in an almost parallel position. If an automobile thus equipped hits a thank-ye-mar'm, the Ideal spring prevents the car springs from coming together and hitting the axle, by assuming the position B. At the same time, a great deal of the energy transmitted to the axle by the shock is taken up by changing the position of the absorber spring, which thus assists the ordinary springs in their business. The opposite effect of the absorber spring is used in hitting a bump. Here the inertia of the spring causes it to take

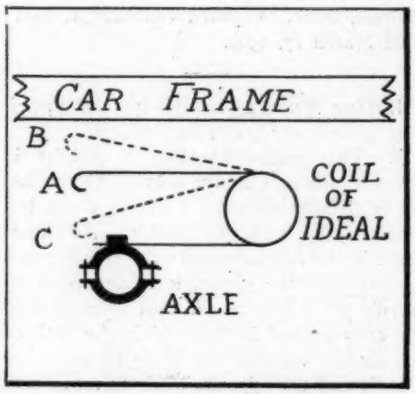


Fig. 2—Principle and operation of Ideal

on the position C, thereby absorbing most of the shock which otherwise would be transmitted to the body and the passengers occupying the same, causing discomfort and deterioration.

While the use of shock absorbers on the rear axle of a car is becoming quite common practice, the application of Ideal springs to the front of the automobile softens the effects of the road inequalities otherwise affecting the power plant and front portion of the chassis, thus relieving these portions of severe strains and adding to the life of the machine as a whole. The Ideal shock absorber springs, which are sold at a very moderate price, are guaranteed against breakage for 5 years. They are handled by the American Sales Company, of 1882 Mount Elliott avenue, Detroit, Mich.

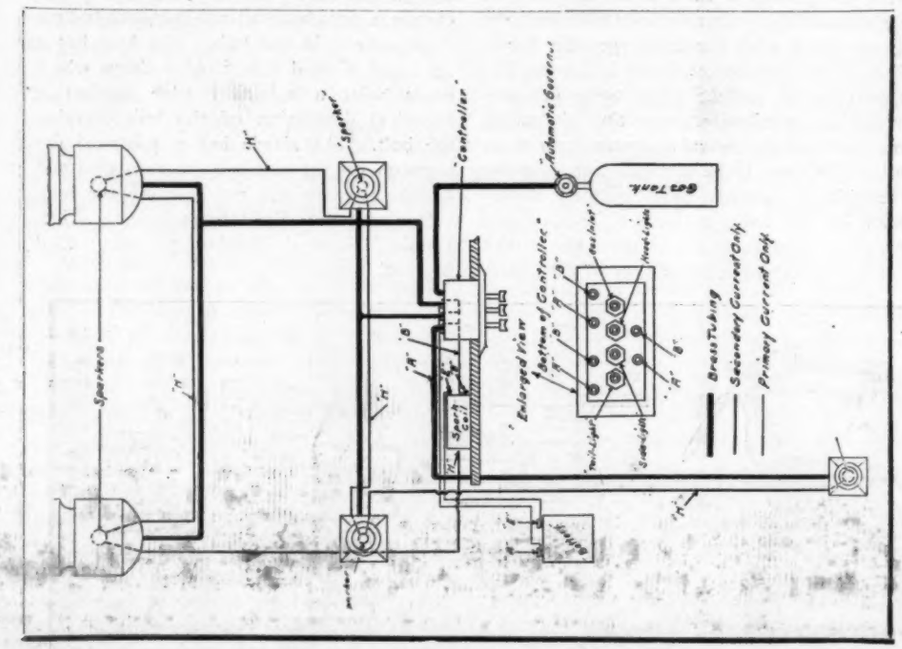


Fig. 3—Wiring and piping diagram of Start-Lite system

Wright Spark Plug

The N. Y. Mica & Manufacturing Company, whose factory is located at Auburn, N. Y., are marketing a new type of Wright spark plug. The claims of principal importance of this new plug made by the manufacturer thereof are the strength and heat-resisting qualities of the porcelain insulation. Where the porcelain core comes in contact with the hex and the asbestos bushings the shoulders of the porcelain core are cut with a round sweep so as to eliminate the danger of cracking at the narrowest point in the porcelain.